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RECLAMATION—ACCOMPLISHMENTS AND CONTRIBUTIONS

REPORT

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STATEMENT OF THE CHAIRMAN

JANUARY 1959.

To Members of the Committee on Interior and Insular Affairs:

Many of you will recall that in the September 1957 issue of "Nation's Business" there appeared an article entitled "Adverse Effects of Expanding Government." This was a condensed version of a nine-part report bearing a somewhat similar title prepared by the Legislative Reference Service of the Library of Congress at the request of 17 Members of Congress. One part of the report was entitled "The Case Against Federal Reclamation."

The request of these 17 Congressmen was specifically for a one-sided report—a report showing the adverse effects of the expanding activities of the National Government on the private economy. The Director of the Legislative Reference Service tried to make this clear in the introduction to the report by disassociating the Legislative Reference Service from the conclusions and by pointing out that the request was for "available data on adverse effects" only and that no claim was made "that these data are complete or that they may not be countered by arguments presented from other points of view." Unfortunately, the article in "Nation's Business" failed to indicate these reservations contained in the introduction to the report and the impression was left with the average reader that this was a factual study by the Library.

Many of us thought that the publication of this article constituted an unjustified and unwarranted attack on the Federal reclamation program and our discussions of the matter led to a committee request, dated November 6, 1958, and signed by eight committee members, to the Director of the Legislative Reference Service for a factual report on the reclamation program with particular emphasis on contributions and accomplishments.

The Legislative Reference Service experienced some delay in preparation of the report because of the resignation of the specialist in engineering and public works and the time required to fill the vacancy. At about midyear, after a conference with Dr. Miller and myself to clarify the committee's request, the study got underway. The report was completed and furnished the committee on December 31, 1958. It presents a factual account of the achievements and contributions of the Federal reclamation program, including its history and background; physical accomplishments; contributions to the local, western, and national economies; feasibility, including costs and repayment; cooperation and coordination with local, State, and other Federal agencies; and a comparison of the reclamation program with other Federal public works programs. I want to commend the authors—Theodore M. Schad, senior specialist in engineering and public works, and John K. Rose, senior specialist in natural resources and conservation—for their excellent professional performance in the prep-

aration of this report. I believe it is a fair and factual treatment of the subject.

The report is reproduced here for your information and for the information of others interested in the Federal reclamation program. I believe you will find it very informative and interesting and that it includes material and statistics which will be valuable to you and to the committee.

WAYNE N. ASPINALL, *Chairman.*

LETTER OF TRANSMITTAL

THE LIBRARY OF CONGRESS,
LEGISLATIVE REFERENCE SERVICE,
Washington, D. C., December 31, 1958.

Hon. WAYNE N. ASPINALL,
Chairman, Subcommittee on Irrigation and Reclamation, Committee on Interior and Insular Affairs, U.S. House of Representatives, Washington, D.C.

DEAR MR. ASPINALL: The enclosed report entitled "Reclamation—Accomplishments and Contributions" has been prepared in response to the request made by you and seven other members of the House Committee on Interior and Insular Affairs, as clarified by further correspondence and discussions with Mr. McFarland of the committee staff.

As requested, the report has been prepared as a factual and objective report on the accomplishments and contributions of the Federal reclamation program. While the report touches on some of the problems of the program, the emphasis, as requested, has been placed on its positive accomplishments and contributions and no attempt has been made to evaluate the program.

I trust that this report will meet your needs as well as those of the Committee on Interior and Insular Affairs. We are furnishing additional copies of the report to you for distribution to the other members who have requested it and to other members of the committee who may be interested.

Sincerely yours,

HUGH L. ELSBREE, *Director.*

LETTER OF TRANSMITTAL

THE LIBRARY OF CONGRESS
LEGISLATIVE REFERENCE SERVICE

RECLAMATION—ACCOMPLISHMENTS AND CONTRIBUTIONS

A FACTUAL REPORT ON THE FEDERAL RECLAMATION PROGRAM WITH COMPARATIVE DATA ON OTHER FEDERAL PROGRAMS PREPARED IN RESPONSE TO A SPECIFIC REQUEST

BY
THEODORE M. SCHAD
Senior Specialist in Engineering and Public Works
and
JOHN KERR ROSE
Senior Specialist in Natural Resources and Conservation

December 15, 1958
Washington 25, D.C.

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RECLAMATION—CONTRIBUTIONS AND ACCOMPLISHMENTS

The purpose of this study is to present a factual account of the achievements and contributions of the Federal reclamation program. It should be made clear at the outset that the intention is not to debate the pros and cons. It is not meant to be an argument for the program—nor does it deal with the various problems that have arisen in connection with it. Comparisons are made between other Federal construction and resource development programs and the reclamation program, but no attempt has been made to look at it as a traditional economic enterprise entered into with the hope of obtaining a profit. It is unavoidable that the discussion should touch on some of the problems of reclamation and that some of the more frequently recurring arguments on both sides should be mentioned. But the main purpose is to set forth the most important facts about the reclamation program without passing judgment.

Through June 30, 1957, approximately $3,658 million of Federal funds had been appropriated to carry out the program, and work had been completed on irrigation facilities which can furnish full or supplemental water supplies to 7,827,598 acres of land, and on power facilities with a total installed generating capacity of 5,031,550 kilowatts. In 1957, crops valued at $928,156,918 were produced on 6,557,266 irrigated acres on 77 Federal reclamation projects, a gross crop value of over $140 an acre. Power revenues in fiscal year 1957, from the sale of over 26 billion kilowatt-hours of energy produced at reclamation projects and at certain other Federal hydroelectric powerplants for which the Bureau of Reclamation markets the power, totaled $64,699,525.

Thus about 5 percent of the value of our national crop production in 1957 was produced on Federal reclamation projects. And over 4 percent of the Nation's total electrical energy output was marketed by the Bureau of Reclamation. The Federal reclamation program is clearly a significant element in our national economy.

It has been in the development of the West that the reclamation projects have played their greatest role. The increasing importance of the West in the economy of the Nation as a whole is widely recognized. As a western Governor has remarked:

> * * * it must not be forgotten that the bulk of our mineral resources, including most of the atomic-age strategic minerals, are located in the arid and sparsely settled area west of the Continental Divide, where the development of adequate supplies of water and power are essential preliminaries to the effective exploitation of these resources.[1]

In this study, therefore, we have attempted to examine the contributions and accomplishments of the Federal reclamation program in relation to the economy of the West, and of the Nation.

[1] Clyde, George D., in "Reclamation Problems," hearings, Committee on Interior and Insular Affairs, U.S. Senate, 85th Cong., 2d sess., January 1958, p. 43.

I. General History and Background of the Reclamation Program

A great national leader of his time once publicly said of the West:

> What do we want with this vast worthless area—this region of savages and wild beasts, of deserts of shifting sands and whirlwinds of dust, of cactus and prairie dogs? To what use could we ever hope to put these great deserts and those endless mountain ranges, impenetrable and covered to their base with eternal snow? What can we ever hope to do with the western coast, a coast of 3,000 miles, rock-bound, cheerless, and uninviting, and not a harbor on it?

Daniel Webster, for all of his wisdom and experience, could not imagine the possibility of harnessing and applying to beneficial use the scarce but nevertheless very significant water resources of the area. He did not recognize that the application of water could transform the most arid regions into a suitable home for man and beast and plant. Having missed that great fact of nature, he could not have the second sight to anticipate the then undreamed of development which has since taken place—the agricultural, mineral, forest, and industrial wealth which has been and will be produced in that so-called arid region—the vast network of modern communications and transportation facilities that links all parts of the West with the rest of our Nation. The development of the West since Daniel Webster's time is based largely on putting water to use for the irrigation of land, and the projects for this development when undertaken by the Federal Government are generally accorded the term, "reclamation." The fact that large parts of the area, now as then, continue as thin forest or extensive grazing land; and, in the more arid areas and drier years, as "shifting sands" or "whirlpools of dust," has not prevented the development of an economy that supports over 40 million people, and is an important factor in the larger economy of the Nation, indeed, of the world.

PRELIMINARY DEVELOPMENTS

Although sporadic settlement had taken place earlier, and, in fact, the first modern irrigation had been practiced by the Mormon settlers in Utah as early as 1847, it was not until 1862, less than a century ago, that the Congress enacted the first legislation leading to the settlement of the West.

The Homestead Act of 1862 permitted settlers to acquire farms of 160 acres free of all charges, except for a small fee, with title to the land to be received when the individual had lived on the homestead for 5 years. A large number of homesteads were successfully claimed under this act, particularly in the less arid areas of the West, but it soon was recognized that the Homestead Act was not well adapted to conditions west of the 100th meridian. If the land were to be put to use for dryland farming or grazing purposes, a quarter section would be too small; if it were to be irrigated, it would be too much for an individual to handle with the methods then in use; or, generally, irrigation was entirely out of the question because of the difficulty of obtaining a dependable water supply for a single homestead. It was to be many years before a workable Federal policy for the irrigation of arid public lands could evolve. However, from time to time various actions were taken by the Congress to promote irrigation development.

One of the first general laws enacted in recognition of the need for extensive works to develop water supplies in the West before settle-

ment could take place was the act of July 26, 1866,[2] which granted rights-of-way for ditches and canals on the public lands to acknowledged holders of valid water rights for irrigation and other purposes. As early as 1867, several bills were introduced in Congresss having as their purpose the encouragement of irrigation and reclamation of unproductive lands in California. Soon after, similar bills were submitted for the other States. Most of the bills were requests for land grants to aid in the construction of canals for irrigation purposes.

On March 3, 1873, the Congress passed an act [3] authorizing a board of five persons to examine and report on a system of irrigation in the San Joaquin, Tulare, and Sacramento Valleys of the State of California. A report by the three Federal members of the board was submitted a year later containing conclusions to the effect that irrigation was much needed in those areas, and that the Government, both State and National, should encourage irrigation by making surveys of irrigable areas and potential canals, by securing information on experiences with irrigation in other areas, and by enlisting the aid of private capital in building irrigation works, with consideration being given as to whether any special inducements need be offered.[4] No action was taken by the Congress, and irrigation projects continued to be slow in developing.

With the passage of time, the need for Federal assistance to aid in full-scale irrigation development became more and more apparent and received increasingly sympathetic response in the Congress of the United States. The first Desert Land Act was passed in 1877.[5] Under this act, provision was made for the reclamation of arid lands in the States of California, Oregon, Nevada (Colorado being added later), and the then Territories of Washington, Idaho, Montana, Utah, Wyoming, Arizona, New Mexico, and Dakota. The act authorized the sale of 640 acres of land at $1.25 per acre to any person who would irrigate it within 3 years. The act also required that—

> all surplus water over and above such actual appropriation and use, together with the water of all lakes, rivers and other sources of water supply upon the public lands and not navigable, shall remain and be held free for the appropriation and use of the public for irrigation, mining and manufacturing purposes subject to existing rights.

However, a 640-acre tract was far too large for individual irrigation, and speculation resulted from operations under this and other acts, which together had allowed one individual to acquire up to 1,120 acres. In 1890, legislation was enacted limiting all entries to a 320-acre maximum for a single claimant.[6]

Although the Desert Land Act was supposed to be "all inclusive," Congress authorized many investigations, which culminated in a number of comprehensive and detailed reports on the state of irrigation and recommendations for action on the part of the Federal Government. Most important of the reports was Maj. John Wesley Powell's "Report on the Lands of the Arid Region of the United States," [7] which appeared in 1878, recommending development and utilization of arid public lands in the West through irrigation, stressing settlement of lands in family-size units, integration of irrigated lands with

[2] 14 Stat. 251.
[3] 17 Stat. 622.
[4] H. Ex. Doc. No. 290, 43d Cong. 1st sess.
[5] Act of Mar. 3, 1877, 19 Stat. 377.
[6] Act of Aug. 30, 1890, 26 Stat. 371.
[7] H. Ex. Doc. No. 73, 45th Cong., 2d sess. (1878).

dry grazing lands, and organization of settlers into local irrigation districts. Later, in response to a Senate resolution, a report prepared by Richard J. Hinton entitled "Irrigation in the United States" [8] contained an analysis of irrigation development in 1886. In February 1889, a Senate resolution authorized the appointment of a select committee of seven Senators, known as the Select Committee on Irrigation and Reclamation of Arid Lands, whose duty it was to consider the subject of irrigation and the best mode of reclaiming the arid lands of the United States. In 1890, this committee submitted a comprehensive report on a bill [9] providing for the creation, with the consent of the States or Territories involved, of natural irrigation districts of three classes throughout the arid region, to be supervised by a board of irrigation commissioners, an irrigation court, and district superintendents of irrigation, forestry, and pasturage. This report had a great effect in educating the public to the importance or irrigation, and the investigations on which it was based provided valuable information for later legislation.

In 1890, the Congress passed an act providing that grants of patents to public lands must reserve to the United States a right-of-way for federally constructed ditches and canals on lands west of the 100th meridian.[10] The following year, legislation was enacted granting rights-of-way through public lands to canal and ditch companies for reservoirs and canals. It also authorized entrymen on public lands to form themselves into associations for the construction of reclamation works.[11]

Then followed a series of unsuccessful attempts to enact legislation to give the States control of irrigation development. Beginning in the 49th Congress (1886), Senator Joseph M. Carey had sponsored bills to promote private irrigation development, and, in later Congresses, to provide for the segregation of the irrigable lands of the arid region, and for granting the same to the several States and Territories thereof for development. In 1894, the Carey Act was finally passed.[12] It authorized donations to each public-land State of a maximum of 1 million acres of desert land in order to aid them—

> in the reclamation of the desert lands therein, and the settlement, cultivation and sale thereof in small tracts to actual settlers. * * *

In return, the State was required to agree to cause the lands to be irrigated, reclaimed, occupied, and cultivated by actual settlers. Tracts sold by the States were limited to 160 acres for one person, and the lands were to be used only for reclamation, cultivation, and settlement. An amendment in 1896 empowered the States to provide for liens against reclaimed lands for actual cost and necessary expense of reclamation.[13]

However, operations under the Carey Act did not produce the results expected; the States were not in a position aggressively to take on the responsibilities that this act entailed. A 1910 study by the Bureau of the Census showed that only 288,553 acres of Carey Act land had been irrigated in 1909, a little over one-tenth of the total land segregated for inclusion in Carey Act projects by that time.

[8] S. Misc. Doc. No. 15, 49th Cong., 2d sess.
[9] S 2401, 51st Cong., 1st sess. S. Rept. 928.
[10] Act of Aug. 30, 1890, 26 Stat. 371, 391.
[11] Act of Mar. 3, 1891, 26 Stat. 1095.
[12] Act of Aug. 18, 1894, 28 Stat. 372.
[13] Act of June 11, 1896, 29 Stat. 413.

Operations under the Carey Act continued, and although the 1920 census shows 523,929 acres irrigated under this act, the total area of land in the projects decreased from 2,574,000 acres in 1910 to 1,189,000 acres in 1920.[14] Ultimate development under the Carey Act reached about 1,100,000 acres, of some 4,000,000 acres segregated. Segregated lands not irrigated were restored to the public domain under an amendment to the Carey Act passed in 1921.

By 1900, a total of about 7.5 million acres were irrigated in the Western States, and it had been shown that irrigation was a catalyst in the economic development of the region. But a considerable part of the best lands, easiest to irrigate, had been developed and westerners were increasingly aware that the further irrigation which was needed to promote economic growth and further settlement would require much more in the way of capital investment than had the earlier developments.

EVENTS LEADING TO FEDERAL RECLAMATION

Probably no one saw the situation more clearly than Francis G. Newlands of Nevada, who is not without reason considered by some to have been the father of reclamation. As early as 1893 he stated:

> Few who have not lived there can realize how entirely dependent that region of the country is on artificial irrigation. Almost all the States which have been the objects of the benefaction of the Government heretofore in this regard have been regions in which the lands have been watered by the rains from the heavens, but in that intermountain country agriculture cannot rely on the chance support from the heavens * * *.
>
> * * * It is therefore utterly impossible to inaugurate a system of settlement in that region similar to that which has existed in the Mississippi and other valleys. Individual settlement and individual reclamation cannot obtain generally * * * it becomes necessary * * * in order to bring larger areas of land within cultivation, to resort to this system of storage, of establishing artificial reservoirs * * * and of constructing canals and ditches at great expense, covering large areas of land by a comprehensive plan.[15]

He argued further that the Government undoubtedly had power to look after its own property in such a fashion as to make it available for settlement:

> * * * the United States Government is the owner of 600 million acres of land in the arid region, of which 100 million acres can be reclaimed by a gradual process of storage extending over 50 or 100 years. The reclamation of these lands will make more valuable the remaining pastoral lands * * *.
>
> * * * The limit of reclamation and settlement has been reached unless the Federal Government, acting, as it can, without regard to State lines, makes a scientific study of each river and its tributaries and so stores the water as to prevent the torrential flow in the spring and to increase the scanty flow in the summer. By doing this its arid lands will be made available for settlers, and it can, if, it chooses, secure compensation by a charge upon the lands.[16]

Numerous bills to establish a Federal reclamation program were introduced in the 55th and 56th Congresses, and public sentiment for Federal reclamation became increasingly favorable.

In 1900, the platforms of the major political parties both favored the undertaking by the Federal Government of the work of reclaiming arid lands.

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[14] Hibbard, Benjamin H. "A History of the Public Land Policies," New York, The Macmillan Co., 1924, p. 437.

[15] Darling, Arthur B., "The Public Papers of Francis G. Newlands," Boston, Houghton Mifflin, 1932, vol. 1, p. 56. Statement dated Dec. 13, 1893.

[16] Ibid., p. 60.

The Republican:

In further pursuance of the constant policy of the Republican Party to provide free homes on the public domain, we recommend adequate national legislation to reclaim the arid lands of the United States, reserving control of the distribution of water for irrigation to the respective States and Territories.

The Democratic:

We favor an intelligent system of improving the arid lands of the West, storing the waters for purposes of irrigation and the holding of such lands for actual settlers.

The Department of Agriculture made studies of irrigation and reached the conclusion that a public program should be undertaken. In his annual report in 1901, Secretary of Agriculture James Wilson in 1901, brought out the importance of irrigation development:

* * * The possibilities of irrigated agriculture are so great that everything which will contribute to its largest and best development is a matter of national interest. We are now in the momentous years when institutions are forming, and the labors of this Department to foster tendencies in the right direction and to correct mistakes before they have become fixed by time and custom should be continued. What is done now affects not only the present generation of irrigators, but will vitally influence those of the distant future.[17]

The Secretary then went on with arguments for the program and suggestions, many of which were later to be incorporated into the Reclamation Act, covering such matters as liberal provisions to encourage settlement, public ownership of storage reservoirs, State control of water rights, antispeculation provisions, and integrated ownership of grazing lands with irrigated lands.

President Theodore Roosevelt, in his message to the Congress of December 3, 1901,[18] expressed many ideas with respect to the development of the West and the formulation of a Federal reclamation program which the passage of time has proved to be unusually pertinent. With regard to the growth of the West, he said:

The western half of the United States would sustain a population greater than that of our whole country today if the waters that now run to waste were saved and used for irrigation.

Ever a stanch believer in forest conservation, he mentioned the value of such work in water conservation before going on to argue the need for and propriety of Federal construction of the great storage works needed for development of the West:

The forests are natural reservoirs. By restraining the streams in flood and replenishing them in drought they make possible the use of waters otherwise wasted. They prevent the soil from washing, and so protect the storage reservoirs from filling up with silt. Forest conservation is therefore an essential condition of water conservation.

The forests alone cannot, however, fully regulate and conserve the waters of the arid region. Great storage works are necessary to equalize the flow of streams and to save the floodwaters. Their construction has been conclusively shown to be an undertaking too vast for private effort. Nor can it be best accomplished by the individual States acting alone. Far-reaching interstate problems are involved; and the resources of single States would often be inadequate. It is properly a national function, at least in some of its features. It is as right for the National Government to make the streams and rivers of the arid region useful by engineering works for water storage as to make useful the rivers and harbors of the humid region by engineering works of another kind. The storing of the floods in reservoirs at the headwaters of our rivers is but an enlargement of our present policy of river control, under which levees are built on the lower reaches of the same streams.

[17] U.S. Department of Agriculture, Annual Report of the Secretary of Agriculture, 1901, p. LXXXVI.
[18] Congressional Record, 57th Cong., 1st sess., Dec. 3, 1901, pp. 85–86.

He briefly summarized the then existing situation, and pointed out the need for protecting existing water rights under State laws:

The pioneer settlers on the arid public domain chose homes along streams from which they could themselves divert the water to reclaim their holdings. Such opportunities are practically gone. There remain, however, vast areas of public land which can be made available for homestead settlement, but only by reservoirs and main-line canals impracticable for private enterprise. These irrigation works should be built by the National Government. The lands reclaimed by them should be reserved by the Government for actual settlers, and the cost of construction should so far as possible be repaid by the land reclaimed. The distribution of the water, the division of the streams among irrigators, should be left to the settlers themselves in conformity with State laws and without interference with those laws or with vested rights. The policy of the National Government should be to aid irrigation in the several States and Territories in such manner as will enable the people in the local communities to help themselves, and as will stimulate needed reforms in the State laws and regulations governing irrigation.

And Roosevelt, more than others, argued that by irrigation development of the West, our Nation would become firmly established in the Pacific, facing the new potential of old Asia.

The reclamation and settlement of the arid lands will enrich every portion of our country, just as the settlement of the Ohio and Mississippi Valleys brought prosperity to the Atlantic States. The increased demand for manufactured articles will stimulate industrial production, while wider home markets and the trade of Asia will consume the larger food supplies and effectually prevent western competition with eastern agriculture. Indeed, the products of irrigation will be consumed chiefly in upbuilding local centers of mining and other industries, which would otherwise not come into existence at all. Our people as a whole will profit, for successful homemaking is but another name for the upbuilding of the Nation

Later, Roosevelt used the argument that reclamation would serve to develop and settle the West and thus integrate it with the rest of the Nation, strengthening the whole:

* * * Most of the works contemplated for construction are of national importance, involving interstate questions, or the securing of self-supporting communities in the midst of vast tracts of vacant land. The Nation as a whole is of course the gainer by the creation of these homes, adding as they do to the wealth and stability of the country, and furnishing a home market for the products of the East and South. * * *.[19]

Bills were introduced—S. 3057 by Senator Hansbrough of North Dakota, chairman of the Senate Committee on Public Lands, and H. R. 9676 by Representative Newlands of Nevada; hearings were held; and favorable reports were filed by the committees of both Houses of Congress. Congressional sentiment appeared predominantly favorable.

The principal question raised by the opponents of the legislation was that of constitutionality. The arguments generally used in rebuttal to the constitutional arguments were to point out the similarity between the contemplated reclamation works and the previously undertaken river improvement works for flood control and navigation, and to claim the constitutional authority under the property clause to take whatever action might be necessary in connection with the disposal of public lands. And it was argued that no general funds of the Treasury would be involved, that only revenues from the sale of public lands would be used, and that expenditures would be repaid to the Government by the settlers.

[19] Congressional Record, 58th Cong., 2d sess., Dec. 7, 1903, p. 7.

But at the same time, it appeared to have been understood that the reclamation fund would probably be inadequate to finance the works needed, and it was argued that general funds of the Treasury should be used. For example, Senator B. F. Tillman of South Carolina had this to say on the floor of the Senate, March 1, 1902:

> The only thing which I see in this proposition that probably is strange is that instead of coming directly to the Treasury and asking a specific appropriation for annual improvement along this line, as we are making continuing contracts for improving rivers and harbors, we come here and merely limit these people to a fund that is somewhat nebulous and will certainly prove inadequate. I think the people of the East—and I live in a State in the East where we get plenty of rain ordinarily—should go at this in a broader and more statesmanlike way, and instead of using the money that is to be derived from these sales, which, as I said, will be uncertain in amount, and the amount is going to be inadequate, we should go at it by a direct appropriation.[20]

And as to the use of general funds, Senator Teller of Colorado implied rather clearly that if the Reclamation Act were successful in achieving its purposes, the westerners would require more money than the reclamation fund would provide, saying:

> Now, Mr. President, as to the proposition that we are coming back here for more money. If we come back here for more money, it will be because we have demonstrated that this is a good method for the Government of the United States to expend its money. I am sure it ought not to be any objection if we should come back here 10 years from now and say, and say it in a way that will convince our legislative bodies that "this work, so far as it has gone, has been a valuable work, and we ask you to increase it." [21]

With respect to repayment by the settlers, supporters of reclamation argued that the return of construction costs would not be the most important return to the Government from the reclamation projects. Senator William M. Stewart of Nevada, speaking for passage of the 1902 act, compared the reclamation projects to rivers and harbors projects, and pointed to the added returns in a speech on March 1, 1902, saying:

> We do many things to promote the general good, to promote commerce. We spend a vast amount of money to improve rivers and harbors. What good does it do? How do you get it back? You get it back in your increased commerce. You get it back in increased employment. You get it back in the increased wealth of the country.[22]

Congressman Reeder of Kansas also argued that a great source of additional Federal revenues would be created by the reclamation program:

> But even if it were so—which I deny—that the Government would not get back its investment from the land itself, it will get it back many times over in the form of revenues from the population created upon these arid lands. We have collected an annual revenue of as high as over $700 million from 76 million people—nearly $10 apiece for every man, woman, and child in the United States. If we were to carry to its full fruition the great project under consideration, the result would be a population in the western half of the United States equal to the whole population of the country today, and the Government could collect in revenue from that population during each 2 years more money than it would ever be called upon to expend for the reclamation of the arid region.[23]

Congressmen from some of the Eastern and Midwestern States argued against the proposed legislation on the grounds that reclamation projects would increase agricultural surpluses and lower farm prices.

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[20] Congressional Record, 57th Cong., 1st sess., Mar. 1, 1902, p. 2279.
[21] Ibid., p. 2283.
[22] Ibid., p. 2278.
[23] Ibid., p. 6740.

Congressman Ray of New York included the following remarks in his speech in opposition to the bill:

It will at the public expense build up competition in the great West with which the farmers in the East must contend, and no one will claim for a moment, because they cannot justly make the contention, that there is today any deficiency of farming lands in the United States. We have broad acres enough; a chance to put to work all who will work. If there is a surplus anywhere today of people who desire to go upon the farm, let them come to New York and we can give them a fair chance to purchase a home, a fair chance to till the soil.[24]

Supporters of the bill countered with the claim that such arguments were an argument against the growth and expansion of our Nation. Congressman Mondell of Wyoming stated:

One of the alleged arguments used against this measure is that it would be unfair to the farmers of the country because it would increase the acreage of our cultivated lands and the aggregate of agricultural produce, and thus tend to keep down farm values and the prices of farm products. * * * If arguments of this sort had been made by the people of the East against the enactment of the homestead law they might have had some force and justification, for that law opened in competition with the comparatively unfertile lands of the seaboard and the Alleghenies, the marvelously rich and fertile lands of the Mississippi Valley, which required only the turning of the sod to produce bountiful crops, and which were granted to the settlers without any payment whatever.[25]

And Congressman Shallenberger of Nebraska made the following statement:

Carried to its complete reduction and logical conclusion by our forefathers, this idea would have precluded the desirability of any development or expansion of our domain west of the Allegheny Mountains.[26]

Congressman Mondell also claimed that there had never in the world been any comprehensive irrigation development except through governmental action. He said:

In all the history of irrigated agriculture, extending over a period of over 4,000 years, no complete and comprehensive development by irrigation has been undertaken or accomplished except through public or semipublic agencies. The wisdom of the universal practice of mankind in this respect, under widely differing physical conditions and forms of law and government is abundantly demonstrated by our experience, beginning as it did in purely private undertakings, leading up through a gradual strengthening of the theory of public control of water used in irrigation to a realization of the necessity of public undertaking and control of certain classes of the works of irrigation.[27]

Another typical argument for the bill was that one of the principal effects of Federal reclamation would be to provide new and enlarged markets for the products of eastern manufacturers. Among those who expressed this argument, Senator J. H. Gallinger of New Hampshire said:

Mr. President, even from a selfish standpoint, or from selfish considerations, I should give my vote in favor of this bill. We are engaged in New England largely in manufactures, and we are seeking new markets for our manufactured goods. I feel sure that every thoughtful New England man will agree that when the arid region of our country is reclaimed, and American families and American homes are established on these lands, it will open a new market for the manufactured goods of New England. Possibly our people have not to any very considerable extent considered that view of the subject, which to my mind would be a controlling reason, if I had no other reason, for voting for the bill that is now before the Senate.[28]

[24] Ibid., p. 6685.
[25] Ibid., p. 6680.
[26] Ibid., p. 6703.
[27] Ibid., p. 6677.
[28] Ibid., p. 2283.

RECLAMATION ACT OF 1902

S. 3057, the bill which finally succeeded in bringing Federal irrigation to the arid West, passed the Senate by voice vote on March 1, 1902, and the House by a vote of 146 to 55 on June 13, 1902.[29] On the next day, the Senate agreed to the House amendments, and the bill was signed into law by President Roosevelt on June 17, 1902. In brief, it provided that the money received from the sale of public lands in 16 States [30] should be set aside as the reclamation fund to be used for the construction and maintenance of irrigation works in the arid regions, the money so expended to be repaid to this fund in 10 annual installments by the settlers. This, as a revolving fund, should continue to be applied for irrigation under the direction of the Secretary of the Interior. The Secretary was given broad authority to make examinations and surveys for, and to locate and construct "irrigation works for the storage, diversion, and development of waters, including artesian wells * * *," and was required only to report to the Congress at the beginning of each session on the results of his operations. It was further provided that each settler claiming title to land on a reclamation project was to comply with the provisions of the homestead law as to settlement, in addition to the payment of his share in the construction cost of the project. No settler was to be entitled to a tract exceeding 160 acres. The Secretary was required to proceed in conformity with State laws relating to the control, appropriation, use, or distribution of water used in irrigation.

A considerable amount of research has failed to uncover the origin of the 10-year period for repayment. On the basis of our present day experience, it is doubtful that, even under the most favorable circumstances, any irrigation project could repay its capital costs within such a short period. In the congressional debate on passage of the Reclamation Act an example was cited of a project built by the British in India which in 1 year produced crops valued at four times the cost of the project.[31] This could hardly have been taken too seriously, however, as an argument for prompt repayment, and it is the authors' view that the primary reason for the repayment requirement was the desire of the proponents of Federal irrigation to get the money involved back into the reclamation fund as soon as possible so that it could be used to build additional projects.

The matter of charging interest on the moneys expended also apparently was never seriously considered in connection with S. 3057. On a predecessor bill, which failed of passage, H. R. 14241 of the 56th Congress, the House Committee on Irrigation of Arid Lands had apparently dismissed all thought of charging interest with the following comment:

> The proposed bill does not provide for the charging of interest nor the hasty pushing forward of the works to completion, in order to bring about an early return, such as is essential to the success of corporate enterprise. In such matters private capital is concerned with obtaining the largest return for the smallest expenditure, while the spirit of the bill under consideration is evidently to bring about the largest development and the greatest good to the greatest number consistent with an economical expenditure. As a result, it appears from the examinations already made that where private capital would find it expedient to

[29] 32 Stat. 388.
[30] This legislation was later extended to include the State of Texas (act of Feb. 25, 1905, 33 Stat. 814; act of June 12, 1906, 34 Stat. 259).
[31] Congressional Record, 57th Cong., 1st sess., June 12, 1902, p. 6700.

reclaim, say, a thousand acres from a given source in order to make the largest return, the Government works, built with a view to the best development of the country, might reclaim ultimately two or three times as much.[32]

All of the arguments considered by the Congress seemed to indicate that interest should not be charged. The works were considered as internal improvements, similar to improvements for navigation and flood control, and the funds were to come from sale of public lands, not from the general funds in the Treasury which might be raised by borrowing on which the Government would have to pay interest. Not even the opponents of the legislation suggested that interest should be charged.

MODIFICATIONS AND EXTENSIONS OF THE RECLAMATION ACT

The Reclamation Act was broadened in 1906, with the passage of the Town Site Act, which permitted the Secretary to contract for municipal water supplies and to lease surplus hydroelectric power from reclamation projects. This was the first congressional action to provide for preference in the lease of power for municipal purposes and is generally considered to be the origin of the "preference clause" in the disposal of power generated at Federal hydroelectric projects. This great step was taken without any significant debate on the issues involved.

A 1910 enactment[33] provided for reimbursable advances to the reclamation fund by the Treasury "to complete Government reclamation projects heretofore begun," and for the first time called for Presidential approval of any new reclamation projects. The $20 million advanced was repaid to the Treasury from the reclamation fund in annual installments of $1 million from 1921 through 1930, and the balance by legislation enacted in 1939.

In 1911, with the passage of the Warren Act, the reclamation program was broadened to provide for Federal cooperation in the development of water supplies and facilities for Carey Act projects and for other non-Federal irrigation projects.

The entire reclamation program was given a thorough review by the Congress at the time of enactment of the Reclamation Extension Act of 1914. Some $76 million had been invested in reclamation works by the United States through June 30, 1913, when Secretary of the Interior Lane, reporting on operations, stated:

> There is one matter of great moment to these people which should be corrected by law as soon as possible. We mistook the ability of the farmer to pay for his water rights. Ten years was the time given. His optimism and our own was too great. That time should be doubled.[34]

The Congress was quick to take action to prevent bringing a great majority of the homesteaders on reclamation projects to the point of bankruptcy, and the repayment period was extended to 20 years by the act of August 13, 1914. In the same act, the Congress also limited the authority of the Secretary of the Interior to make expenditures from the reclamation fund to amounts specifically appropriated by the Congress. With Presidential approval of new projects and annual

[32] U.S. Congress. House. Committee on Irrigation of Arid Lands. "Reclamation of Arid Lands," p. 6 (56th Cong. 2d sess., H. Rept. 2927).
[33] Act of June 25, 1910, 36 Stat. 835.
[34] U.S. Congress. Senate. Committee on Irrigation and Reclamation of Arid Lands. "Extend Time of Payments to Water Users" (63d Cong., 2d sess., S. Rept. 312), p. 2.

congressional approval of appropriations as a requirement, the authority of the Secretary of the Interior was greatly curtailed, and the reclamation program was placed under congressional supervision similar to that given other Federal improvement programs.

In 1920, the reclamation fund was bolstered by providing that a portion of the revenues from mineral leases on public lands were to be deposited in it. In the same year, the Secretary was given general authority to contract to supply water from any project irrigation system for miscellaneous purposes other than irrigation.

ACTION TO ALLEVIATE HARDSHIPS

From time to time during the agricultural depression of the early 1920's, it became necessary for the Congress to extend the time for payment of construction charges in order to grant relief to water users on Federal irrigation projects, and in 1924 a committee of special advisers on reclamation, known as fact finders, was appointed by the Secretary of the Interior to review the entire program and particularly the difficulties encountered in meeting repayment requirements. The committee found that by the end of the previous fiscal year (June 30, 1923), 1,202,130 acres, in 28 projects, had been irrigated, and net construction costs had reached $141,787,005.74. In addition, 1,101,700 acres of land were receiving part of their water supply under Warren Act contracts. About 11 percent of total costs or $15,592,842.48 had been repaid by the water users.

The committee also found that project costs had far overrun estimates, that the costs to the settlers of farm development far exceeded expectations, and that inadequate consideration had been given to such matters, among others, as soils, agricultural problems, project economics, and drainage, and that there had been a considerable amount of speculation in connection with the sale of private lands within reclamation projects. As a result, over half of the settlers were not making adequate economic progress and, of the funds expended to that time on the program, $27,691,146 could probably never be recovered.

Largely on the basis of the committee's report, legislation was enacted in 1924 [35] to alleviate some of the shortcomings of the reclamation program. Subsequently, the Omnibus Extension Act of 1926 [36] provided for writing off over $14 million in construction charges in connection with unproductive lands or errors and mistakes in engineering and construction, gave the Secretary discretion to extend repayment contracts to a maximum of 40 years, and reinforced the antispeculation provisions of the reclamation laws, by requiring private owners of project lands to agree, before any water was delivered, to sell lands in excess of 160 irrigable acres at preproject appraisals. The act included numerous other provisions to protect the interests of both the Government and the settlers, and provided a basis for continuation of the reclamation program until the evolution of multiple purpose concepts necessitated a revision of the reclamation laws in 1939.

[35] Act of Dec. 5, 1924, 43 Stat. 672, 701–704 (Fact Finders' Act).
[36] Act of May 25, 1926, 44 Stat. 636.

MULTIPLE PURPOSE DEVELOPMENT

It was natural for the less complex, single purpose irrigation projects to be developed first, but with the growth of the West, the demand for putting water to use to serve other purposes increased, and the reclamation engineers began to envision some of the huge multiple purpose projects which have characterized the more recent reclamation program. First of the major multiple purpose projects to be authorized was the Boulder Canyon project in 1928.[37] The magnitude and precedent-breaking scope of this project is illustrated by the fact that today, 30 years later, the great Hoover Dam constructed under this authorization is still the highest dam in the United States, and Lake Mead, its reservoir, has the largest storage capacity. The precedent-breaking nature of this project called for special legislation governing such matters, among others, as repayment, the establishment of a special fund for construction of the project, and the approval by Congress of the Colorado River compact dividing the waters of the Colorado River between the upper and lower basins. Since that time, most of the major multiple purpose project authorizations have been authorized by special legislative enactments, although in several cases, notably the Central Valley and Columbia Basin (Grand Coulee Dam) projects, construction was started under Secretarial findings, approved by the President, and later authorization by the Congress was given in omnibus rivers and harbors legislation.

RECLAMATION THROUGH THE DEPRESSION YEARS

The great economic depression of the 1930's undoubtedly gave a great impetus to the reclamation construction program through the stimulation of these great multiple purpose projects, as well as a number of other, smaller projects, some of which were undertaken under emergency relief fund authorization. However, again, the decline in agricultural prices made it necessary for Congress to grant general moratoria on repayments of construction charges for several years, and in addition, numerous special acts granting relief to specific projects were enacted. Again, settlers on reclamation projects were suffering economic distress.

Multiple purpose concepts were enlarged in 1934 [38] to provide for consultation with Federal fisheries and wildlife agencies prior to construction of dams with a view toward providing for migration of fish and better protection of wildlife resources. In 1938 [39] hydroelectric power operations of the Bureau of Reclamation were expanded to include disposal of power generated at the Fort Peck project, then under construction by the Corps of Engineers. Construction of smaller projects in the Great Plains and other arid and semiarid areas was facilitated by the Wheeler-Case Act [40] and its later amendment,[41] which established special criteria for the use of emergency relief authorities and for cooperation with the Secretary of Agriculture in the settlement of the projects.

[37] Boulder Canyon Project Act, 45 Stat. 1057
[38] Act of Mar. 10, 1934, 48 Stat. 401.
[39] Act of May 18, 1938, 52 Stat. 403.
[40] Act of Aug. 11, 1939, 53 Stat. 1418.
[41] Act of Oct. 14, 1940, 54 Stat. 1119.

But the problems which had arisen along with the expansion of the reclamation program in the thirties made it evident that some overhaul of the basic legislative authority was needed. This was accomplished with the passage of the Reclamation Project Act of 1939,[42] which modified and brought up to date general provisions of reclamation law pertaining to multiple purpose project authorizations, amendatory repayment contracts, variable repayment plans, classification of lands as to irrigability and productivity, contracts for the sale of water for irrigation and municipal water supply purposes, and sale of electric power. In this act for the first time the Secretary was authorized to enter into contracts for repayment of the costs of the irrigation water supply works on a utility basis. While the 40-year limitation of the contract period remained, there was no requirement that all water supply costs be returned within the first 40-year period. Thus the repayment period was again permitted to be lengthened. However, the 40-year period for return of irrigation distribution system costs, after a maximum of a 10-year repayment-free development period, remained in effect. In the 1939 act, also, the Secretary was authorized to make nonreimbursable allocations to flood control and navigation, after consultation with the Secretary of the Army.

A number of multiple purpose projects were authorized and started under the 1939 act, but the coming of the Second World War forced a gradual slowdown in the reclamation program although, from time to time, emphasis was placed on speeding up particular projects to provide hydroelectric power for defense purposes, or for food and fibers to alleviate the general shortages brought about by wartime conditions. Toward the close of the war, the Congress became concerned with the possibility of postwar unemployment, and authorized vast multiple purpose river basin developments so that a backlog of construction projects would be available. Among these was the Pick-Sloan plan for the Missouri River Basin, the initial stage of which was authorized in the Flood Control Act of 1944, as the first comprehensive multiple purpose river basin development program participated in by the Bureau of Reclamation.

POSTWAR RECLAMATION

The end of the war found the Bureau of Reclamation making plans for a greatly expanded reclamation program. A great many new projects were started, and by 1950 annual appropriations exceeded three times the prewar maximum. Each year new projects were authorized and placed under construction, with ever-increasing emphasis on multiple purpose development.

The Fish and Wildlife Coordination Act was amended[43] greatly to strengthen this phase of multiple purpose water development and to permit the Secretary of the Interior to make nonreimbursable allocations of the part of the estimated costs of reclamation projects which could "properly be allocated to the preservation and propagation of fish and wildlife." In 1946 appropriations for prosecution of the balance of the comprehensive plan for Missouri River Basin development were authorized,[44] and progress toward this was rapid. A significant phase in the accomplishment of the Missouri Basin

[42] Act of Aug. 4, 1939, 53 Stat. 1187, 43 U.S.C. 485.
[43] Act of Aug. 14, 1946, 60 Stat. 1080.
[44] Act of July 24, 1946, 60 Stat. 641.

program was the allocation of substantial amounts of funds to the other resource conservation agencies of the Department of the Interior to carry on investigations and developments of resources related to the water resources. Through fiscal year 1957, almost $45 million of Missouri River Basin project funds has been applied on related programs of other Interior agencies, such as fish and wildlife, recreation, mapping, Indians, public lands, and minerals.

The potential value of reclamation reservoirs for outdoor recreation has long been recognized by those who live in their vicinity, but authorization for Federal participation in the development of recreational opportunities has come only recently, and the irrigation water users have generally been unwilling to foot the bill themselves. In the thirties, development of recreational facilities in connection with Lake Mead behind Hoover Dam, Millerton Lake behind Friant Dam, and Lake Franklin D. Roosevelt behind Grand Coulee Dam was undertaken by the National Park Service, and these areas have seen tremendous usage. Likewise, under cooperative agreements with the Forest Service, some recreational facilities at reclamation reservoirs within national forests have been developed by that Service. In recent years, legislation authorizing several Federal reclamation projects has included authorization for installation of minimum basic recreational facilities at reservoirs on a nonreimbursable basis, but in spite of the fact that numerous bills have been introduced, there is as yet no general basic legislation covering recreational developments at these projects. The wide use of this recreational resource will undoubtedly be one of the matters to be considered by the recently authorized on Outdoor Recreation Resources Review Commission.

EXCESS LAND LIMITATIONS

In the late 1940's, a determined attempt was made to exempt some of the larger reclamation projects serving privately owned lands, particularly the Central Valley project in California, from the excess land limitations of the Federal reclamation laws. Earlier, the privately owned lands receiving supplemental water supplies on the Colorado Big-Thompson project [45] and certain lands on the Humboldt and Truckee storage projects [46] had been so exempted, and the Interior Department administered the law in such a way as to permit a man and wife to hold up to 320 acres under community property laws. After a bitter fight through several sessions of Congress, the exemption for the Central Valley project was defeated. The fight was continued in the courts when several repayment contracts containing the 160-acre limitation were declared invalid by the California Supreme Court. However, the recent U.S. Supreme Court decision in the Ivanhoe case [47] upheld the constitutionality of the 160-acre limitation on private lands and the validity of contracts containing excess land limitation provisions.

In the meantime a mass of information on the workings of the excess land limitations had been compiled by the Congress, as it was obvious that there were some instances where the law worked a real hardship. In the 1950's, several projects in high altitude areas were exempted from the 160-acre limitation, as were the lands irrigated by pumping

[45] Act of June 16, 1938, 52 Stat. 764.
[46] Act of Nov. 29, 1940, 54 Stat. 1219.
[47] 357 U.S. 275.

from ground water on the Santa Maria project in California. A new approach to excess land problems, sometimes known as the Engle formula, was used in the Washoe project authorization [48] and in the Small Reclamation Projects Act.[49] This would permit landownership in excess of 160 acres provided the costs attributable to the excess landholdings were repaid with interest at prevailing rates. In the most recent Congress, other projects in high-altitude areas were exempted, and a concept of permitting farm sizes sufficient to produce income equivalent to 160 acres of class 1 land was developed and used for the East Bench unit of the Missiouri River Basin project in Montana [50] and the Seedskadee project in Wyoming.[51]. Under this concept, land of lesser earning capacity than class 1 lands is counted as less than its full acreage in determining the permissible size of a family-size farm. The matter of excess land provisions in contracts for the delivery of irrigation water from Corps of Engineers projects under the Federal reclamation laws is still under study.

COLORADO RIVER STORAGE PROJECT

In recent years, other adaptations of the reclamation laws have been evolved by the Congress to deal with problems that have arisen. No discussion of the reclamation program would be complete without mention of the Colorado River storage project. When the Colorado River compact was negotiated in 1922, it divided the waters of the river in such a way that the upper basin has an obligation to deliver a set amount of water to the lower basin in each consecutive 10-year period. In order to permit substantial additional developments in the upper basin while meeting this obligation to deliver water to the lower basin, it was obvious that tremendous storage capacity would be required to even out the flow of the river over wet and dry cyclical periods. In addition, there was a desire on the part of residents of the basin to use power revenues to help in repayment of the high costs of new irrigation projects in the same way that this is done in the Missouri Basin and Columbia Basin project developments. To accomplish these objectives, the Colorado River storage project was conceived. After several sessions of the Congress in which authorization bills failed of passage, largely because of opposition to the proposed construction of dams in a national monument, the Colorado River storage project, modified to exclude any dam construction in national parks or monuments, was authorized in 1956.[52] This legislation, while authorizing only certain specific units and projects, provides for studies and investigations leading to the ultimate full development of the usable water resources of the upper Colorado River Basin. The legislation establishes a special revolving fund, to be accounted for on a businesslike basis, to carry out the project purposes. The fund is set up in such a way as to permit operation, maintenance and replacement, and emergency expenditures on the project to be carried out without further appropriations by the Congress. The authorization requires power, municipal water, and irrigation costs to be returned to the general fund of the Treasury within a 50-year period

[48] Act of Aug. 1, 1956, 70 Stat. 775.
[49] Act of Aug. 6, 1956, 70 Stat. 1044.
[50] Act of July 24, 1957, 71 Stat. 309.
[51] Act of Aug. 28, 1958, 72 Stat. 693.
[52] Act of Apr. 11, 1956, 70 Stat. 105.

from the date of completion of the particular unit or feature, with interest at rates prevailing at the time the unit or project is initiated on costs allocated to power and municipal water supply. The legislation provides for development of recreational and fish and wildlife resources in connection with the project, but not under the basin fund. The legislation, for the first time, permits contracts for municipal water service to be made without regard to their effect on the efficiency of the project for irrigation purposes, thus emphasizing the changing concepts of water use as the West grows.

The Colorado River storage project legislation also includes a provision which has been used in several recent project authorizations and is intended to prevent, for a 10-year period, the production on newly irrigated project lands of any basic agricultural commodity if the total supply of such commodity is in excess of the normal supply as defined in the Agricultural Adjustment Act of 1938, as amended.

RECENT AMENDMENTS TO THE RECLAMATION LAWS

Another recent trend in the evolution of the reclamation laws has been the establishment of loan programs, first, for distribution systems,[53] and later for small projects.[54] Under these authorizations, the Secretary of the Interior is authorized to make interest-free loans to irrigation districts that wish to construct their own facilities. Repayment contracts are required under the former which subject the lands benefited to the general provisions of the reclamation laws. The small project loan program is similar, except that it substitutes provisions calling for interest to be charged on the pro rata portion of costs allocable to lands in 1 ownership in excess of 160 acres for the excess lands provisions of the reclamation laws. It is hoped, by the loan program approach, that administrative and overhead charges, which have been quite high on some of the smaller federally constructed projects, can be minimized.

Provisions of section 9(e) of the Reclamation Project Act of 1939, which permitted the Secretary to contract for return of costs of irrigation water supply works on a utility basis, led to some uneasiness among holders of such contracts as to the status of their water rights, particularly since section 9(e) was silent on the matter of renewal of contracts. This led to action by the Congress to clarify rights under these contracts, which was accomplished by the enactment of Public Law 643, 84th Congress.[55] The legislation gives parties to contracts under section 9(e) the right of renewal, the right to convert to the more traditional 9(d) contract, credit toward construction costs of any amounts paid under a 9(e) contract that are in excess of operation and maintenance costs, a firm water right, permits semiannual payments in advance of water deliveries, and calls for a construction component to be included in the contract. Section 8 of the original Reclamation Act, calling for the Secretary to comply with State water laws, was also reenacted in Public Law 643.

The most recent of the general modifications to the Reclamation laws has been Public Law 85–611,[56] which authorizes the Secretary to enter into repayment contracts under variable repayment plans re-

[53] Act of July 4, 1955, 69 Stat. 244.
[54] Act of Aug. 6, 1956, 70 Stat. 1044.
[55] 70 Stat. 483.
[56] Act of Aug. 8, 1958, 72 Stat. 542

lated to the value of crops produced each year and other economic factors. Such variable repayment contracts had been previously authorized from time to time in connection with specific project authorizations, and the new, general legislation will give this provision general applicability. This should help in alleviating the economic problems of the settlers in times of declining agricultural prices.

Many other laws and policies could be mentioned in discussing the history of the reclamation program, however, it is believed that the most significant have at least been mentioned. The basic point to be remembered is that the reclamation program is a dynamic, changing program, adaptable to changing circumstances through legislative amendments of the reclamation laws based on past experience, and this should be kept in mind as background for our discussion, in succeeding chapters, of the accomplishments and contributions of Federal reclamation.

II. Physical Accomplishments of the Reclamation Program

IRRIGATION DEVELOPMENT

The original Reclamation Act of 1902 required that the major part of funds received from the sale of public lands within each State be used for the benefit of lands within that State. This was interpreted as requiring that one or more projects be built in each Western State, and in the first few years after 1902 there was a great rush to get at least one project started in each of the 16 States named in the Reclamation Act. Thus, before 1910, some 25 projects had been initiated. Construction on some of the units and facilities of these projects continued for more than 20 years, and because of the limitations of the reclamation fund, and preoccupation with emerging problems in connection with the projects underway, few new projects were started in the next two decades—from 1911–20 only four and from 1921–30 only six, including the gigantic Boulder Canyon project which was not financed from the reclamation fund. From 1931 through 1940, 33 additional projects were authorized, including a number of Water Conservation and Utilization Act projects. The 1941–50 decade saw 22 new project authorizations, counting the Missouri River Basin project as one project. However, the cost of the Bureau of Reclamation portion of this great development exceeds the cost of the balance of the entire reclamation program authorized through 1950. Authorizations have continued at a rapid rate, and through June 30, 1957, 17 additional projects were authorized, one of which, the Colorado River storage project and participating projects is estimated to cost almost a billion dollars. Four more projects were authorized in fiscal year 1958. Table I summarizes project authorization by decades.

TABLE I.—*Summary of reclamation project authorization* [1]

(1) Period	(2) Reclamation projects authorized	(3) Total irrigable acreage			(4) Installed power capacity (ultimate kilowatts)	(5) Estimated total cost (ultimate)
		Full	Supplemental (ultimate)	Total		
1902–10	25	2,295,944	1,463,400	3,759,344	159,350	$376,061,942
1911–20	4	102,696	16,111	118,807	4,600	40,629,912
1921–30	6	772,421	122,832	895,253	1,354,300	270,797,791
1931–40	33	1,619,876	1,970,586	3,590,462	3,350,700	2,028,924,107
1941–50 [2]	22	3,677,893	525,527	4,203,420	1,333,700	4,019,186,182
1951–57	17	210,224	354,971	565,195	1,275,000	1,203,408,917
Fiscal year 1958	4	17,221	69,440	86,661		55,740,000
Total	111	8,696,275	4,522,867	13,219,142	7,477,650	7,994,748,851

[1] Compiled from data in report of the Commissioner of the Bureau of Reclamation, 1957. Statistical appendix, with 1958 data added.
[2] Includes Missouri Basin project.

The first Federal reclamation works were completed to serve 39,300 acres of land in 1906, and about 22,000 acres were actually irrigated, producing crops valued at about $245,000. Since that time, progress has been rapid. Works to serve a million acres were completed by 1911, but it was not until the war year of 1917 that over a million acres were irrigated. The First World War saw a tremendous increase in both irrigable and irrigated acreage, and an accompanying increase in the value of crops produced, which exceeded $100 million for the first time in 1918. With the exception of minor decreases in irrigated acreages in the depression years of the early twenties and in 1932, the irrigated acreage has shown gradual year-to-year increases, until in the 1957 crop year 6,557,266 acres were irrigated, of 7,827,598 acres for which irrigation works were complete.

The gross value of crops produced reached the $100 million level for the first time during the war year of 1918, but has naturally fluctuated from year to year with the prices of agricultural commodities, receding to a low point of $50 million in 1932. The gross crop value exceeded half a billion dollars for the first time in 1946, and in the last 6 years has averaged about $900 million, or between $130 and $150 per acre served. With gross crop values of $928 million in the 1957 crop year, the cumulative total value of crops produced on Federal reclamation projects reached $13.27 billion. Table II contains data on irrigable and irrigated acreage, and value of crops produced.

TABLE II.—*Acreage and crop values,*[2] *Federal reclamation program 1902–57*

Year	Irrigable acreage	Irrigated acreage	Gross crop values	
			Annual	Cumulative
1906	39,300	[1] 22,300	[1] $244,900	
1907	266,300	[1] 187,628	[1] 4,760,460	$5,005,360
1908	488,942	[1] 289,549	[1] 7,635,888	12,641,248
1909	730,601	410,628	11,920,663	24,561,911
1910	917,751	473,423	12,974,639	37,536,550
1911	1,042,609	564,681	13,121,224	50,657,774
1912	1,205,236	618,680	14,479,368	65,137,142
1913	1,255,381	699,183	15,732,215	80,869,357
1914	1,240,875	761,271	16,475,517	97,344,874
1915	1,472,772	856,778	18,164,452	115,509,326
1916	1,405,452	922,821	32,815,972	148,325,298
1917	1,599,525	1,057,513	56,462,313	204,787,611
1918	2,684,361	[1] 1,642,616	[1] 101,821,396	306,609,007
1919	2,647,974	2,103,568	152,978,887	459,587,894
1920	2,845,252	2,205,420	113,677,420	573,265,314
1921	2,820,910	2,228,750	94,526,430	667,791,744
1922	2,794,400	2,185,420	83,601,690	751,393,434
1923	2,949,800	2,265,080	102,604,160	853,997,594
1924	3,043,615	2,221,560	109,726,030	963,723,624
1925	3,142,970	2,339,470	131,264,730	1,094,988,354
1926	3,173,570	2,508,210	110,414,940	1,205,403,294
1927	3,439,860	2,527,105	133,207,210	1,338,610,504
1928	3,373,665	2,677,100	143,573,070	1,482,183,574
1929	3,402,370	2,718,130	161,179,880	1,643,363,454
1930	3,634,112	2,790,856	119,661,820	1,763,025,274
1931	3,616,236	2,846,607	73,960,377	1,836,985,651
1932	3,551,479	2,769,605	50,158,381	1,887,144,032
1933	3,539,709	2,828,787	84,191,733	1,971,335,765
1934	3,494,645	2,837,205	100,943,714	2,072,279,479
1935	3,614,095	2,935,616	106,781,294	2,179,060,773
1936	3,693,417	3,038,187	136,502,480	2,315,563,253
1937	3,766,212	3,114,801	118,658,272	2,434,221,525
1938	3,782,933	3,106,699	113,463,460	2,547,684,985
1939	3,889,540	3,140,976	114,082,794	2,661,767,779
1940	4,179,868	3,391,070	117,788,677	2,779,556,456
1941	4,946,154	3,448,383	159,885,998	2,939,442,454
1942	4,848,701	3,936,235	272,048,516	3,211,490,970
1943	4,853,832	4,055,329	388,670,969	3,600,161,939
1944	4,939,995	4,163,703	411,226,364	4,011,388,303
1945	5,030,336	4,162,588	435,184,395	4,446,572,698
1946	5,150,831	4,321,969	530,623,945	4,977,196,643
1947	5,165,783	4,461,702	555,420,804	5,532,617,447
1948	5,380,015	4,558,755	534,623,541	6,067,240,988
1949	5,678,512	4,820,589	516,329,008	6,583,569,996
1950	6,024,510	5,077,186	578,237,709	7,161,807,705
1951	6,713,015	5,875,769	821,721,665	7,983,529,370
1952	6,994,478	5,955,750	935,679,755	8,919,209,125
1953	7,147,528	6,097,615	785,939,868	9,705,148,993
1954	7,231,770	6,125,766	865,025,682	10,570,174,675
1955	7,367,739	6,261,761	827,705,742	11,397,880,417
1956	7,658,801	6,400,143	951,623,656	12,349,504,073
1957	7,827,598	6,557,266	928,156,918	13,277,660,991

[1] Estimated.
[2] From statistical appendix to the report of the Commissioner of the Bureau of Reclamation, 1957.

HOMESTEAD OPPORTUNITIES

But value of crops produced alone does not tell the whole story of Federal reclamation's agricultural accomplishments. One of the primary objectives of the program has always been to foster the family-size farm, and in spite of the continued economic pressure toward the large-scale corporate farm, the Federal reclamation program has continued to make new family-farm opportunities available for homesteading, even though the bulk of the recent irrigation projects have been to furnish supplemental water supplies to lands already irrigated and to irrigate new lands already in private ownership. From the end of World War II through fiscal year 1957,

2,842 new farm units containing 264,240 acres have been made available for homesteading. Some idea of the demand for these opportunities is shown by the fact that 134,620 applications were filed for these farms, an average of over 47 applicants for each available farm. The distribution of these available farm units by project and State is shown on table III. The most recent openings, for 16 farm units on the Wellton-Mohawk division of the Yuma project and 35 farm units on the north side pumping division of the Minidoka project, drew 2,451 and 5,227 applicants, respectively, or over 150 for each farm available. The lure of homesteading in the West is still strong.

TABLE III.—*Homestead opportunities on reclamation projects, 1946–58*[1]

Project and state	Acres	Farm units	Number of applicants
Boise, Idaho	4,489	50	1,527
Boulder Canyon, Coachella division, California	1,369	20	3,004
Columbia Basin, Wash.	93,672	1,238	56,246
Gila, Ariz.	17,325	134	17,769
Klamath, Calif.-Oreg.	19,332	216	11,177
Minidoka, Idaho	80,294	714	35,050
Missouri River Basin, Hanover Bluff unit, Wyoming	934	6	134
Owyhee, Oreg.	138	3	63
Riverton, Wyo.	18,420	159	2,887
Shoshone, Wyo.	23,005	218	3,003
Sun River, Mont.	74	1	46
Yakima, Wash.	4,103	56	2,905
Vale, Oreg.	55	1	56
Yuma, Ariz.	1,330	26	753
Total	264,240	2,842	134,620

[1] Summarized and brought up to date from report of the Commissioner of Reclamation, 1957, statistical appendix.

In 1957, the Bureau of Reclamation supplied irrigation water to 126,890 farms, and, in addition, to 142,379 acres of urban and suburban residential, commercial, and industrial lands not used for commercial agricultural production. Total population of the area furnished irrigation service was estimated by the Bureau at 1,217,199. A breakdown of the area and population serviced with irrigation water is shown on table IV.

TABLE IV.—*Irrigation service, 1957—Reclamation program*[1]

Item	Number	Irrigable acreage for service	Population
Full time farms (farm operating units):			
Full water service	50,845	3,881,385	194,613
Supplemental water service	50,554	3,430,841	195,421
Temporary water service	689	56,628	2,205
Part-time farms:			
Full water service	17,079	181,196	59,244
Supplemental water service	7,702	134,909	34,824
Temporary water service	21	260	68
Urban and suburban residential, commercial, and industrial lands: Present irrigable acreage [2]	----------	142,379	730,824
Total	126,890	7,827,598	1,217,199

[1] U.S. Department of the Interior, Bureau of Reclamation. "Crop Report and Related Data, Federal Reclamation Projects, 1957."

[2] Includes residental farms, towns, industrial areas, airports, highways, golf courses, etc., in nonagricultural uses.

HYDROELECTRIC POWER PRODUCTION

Second in importance of the major accomplishments of the reclamation program is the production of hydroelectric power. Development of power under the authorization contained in the Town Site Act of 1906 began with a temporary installation of 1,200 horsepower capacity in connection with the Roosevelt Dam, Salt River project, Arizona. This installation, later increased in capacity to over 19,000 kilowatts, and the Spanish Fork powerplant constructed by the Bureau of Reclamation on the Strawberry Valley project in Utah, were turned over to the water users for operation, along with some of the other early powerplants. The first powerplant to be constructed and operated by the Bureau of Reclamation was on the Minidoka project in Idaho, where the first 1,200 kilowatt capacity unit came into production in 1909. Capacity was expanded to 3,600 kilowatts in the next year, and to 6,000 kilowatts by 1911.

The Boise project, also in Idaho, saw the next reclamation power development in 1912, a 1,500 kilowatt powerplant at the Diversion Dam. This was followed by the 600 kilowatt Lingle plant on the North Platte project in Wyoming. With several other small powerplants on the Newlands and Salt River projects that were turned over to the water users for operation, this was the extent of the reclamation power development through 1920. A few other small plants were constructed in the decade of the twenties and the early thirties, but the major growth of the reclamation power program did not take place until the Hoover Dam powerplant was constructed, and a few years later, the Grand Coulee Dam powerplant. These two large projects still contain well over half the entire electric generating capacity of the Bureau of Reclamation. In 1938, with the passage of the Fort Peck Act, for the first time the Bureau was authorized to market power from a project built by another Federal agency. This part of the reclamation power program has grown, until about 15 percent of the power marketed by the Bureau of Reclamation comes from powerplants constructed by other Federal agencies, largely from the main stem dams on the Missouri River constructed by the Corps of Engineers as a part of the comprehensive development of that river basin. The growth of the reclamation power program over the years, with gross power revenues, is shown on table V. All of the gross power revenues are credited to the reclamation fund except (1) revenues from powerplants built by the Corps of Engineers and the International Boundary and Water Commission, which are deposited in the general fund of the Treasury as miscellaneous receipts, (2) revenues from Hoover Dam which are deposited in the Colorado River Dam fund, (3) revenues from the Fort Peck project, which are deposited in the Fort Peck continuing fund, and (4) revenues from the Eklutna project, which are paid into the Treasury as miscellaneous receipts. Revenues from the Colorado River storage project powerplants, when completed, will be credited to the Upper Colorado River Basin fund.

TABLE V.—*Bureau of Reclamation power program:*[1] *Installed capacity and gross power revenues, 1909–57*

Fiscal year	Installed capacity at end of year		Gross power revenue		
	Bureau of reclamation	USCE and IBWC plants power marketed by Bureau of Reclamation	Bureau of Reclamation	Bonneville Power Administration from reclamation projects	Total
1909	1,200				
1910	3,600				
1911	6,000				
1912	7,500				
1913	7,500				
1914	7,500				
1915	7,500				
1916	7,500				
1917	7,500				
1918	7,500		[2] $185,172		$185,172
1919	8,100		88,585		88,585
1920	8,100		134,094		134,094
1921	8,100		164,745		164,745
1922	9,700		169,794		169,794
1923	9,700		167,258		167,258
1924	9,700		169,939		169,938
1925	10,500		183,884		183,884
1926	19,300		[3] 519,163		519,163
1927	23,300		390,795		390,795
1928	28,100		559,943		559,943
1929	28,100		550,482		550,482
1930	28,900		640,221		640,221
1931	28,900		946,742		946,742
1932	32,900		674,626		674,626
1933	35,300		618,150		618,150
1934	35,300		574,489		574,489
1935	35,300		593,517		593,517
1936	35,300		667,408		667,408
1937	370,100		1,048,778		1,048,778
1938	492,600		2,761,449		2,761,449
1939	657,600		4,253,091		4,253,091
1940	772,500		4,996,299		4,996,299
1941	816,800		6,985,434	$9,073	6,994,507
1942	1,228,300		7,069,214	902,879	7,972,093
1943	1,684,900		6,613,132	3,428,441	10,041,573
1944	2,162,900	35,000	17,654,375	6,999,326	24,653,701
1945	2,245,400	35,000	15,950,047	5,078,961	21,029,008
1946	2,095,400	35,000	17,035,958	6,000,000	23,035,958
1947	2,095,400	35,000	17,021,391	6,000,000	23,021,391
1948	2,494,400	50,000	19,676,602	6,200,000	25,876,602
1949	2,757,400	50,000	24,168,169	9,000,000	33,168,169
1950	3,168,400	50,000	26,361,663	10,000,000	36,361,663
1951	3,939,500	50,000	27,864,774	10,000,000	37,864,774
1952	4,181,200	85,000	33,475,219	11,100,000	44,575,219
1953	4,421,200	85,000	36,108,761	11,881,000	47,989,761
1954	4,718,450	196,500	37,035,732	16,821,210	53,856,942
1955	4,851,550	356,500	39,015,139	16,144,000	55,159,139
1956	4,971,550	506,500	42,980,787	16,217,000	59,297,787
1957	5,028,550	776,500	48,577,219	16,122,306	64,699,525
Total			444,652,240	152,004,196	596,656,436

[1] Report of the Commissioner of the Bureau of Reclamation, 1957. Statistical appendix.
[2] Minidoka project power revenues, 1909 through 1918.
[3] Includes Boise project power revenues, 1912 through 1926, in amount of $216,285.

Through fiscal year 1957, almost $600 million in gross power revenues had been collected, of which about $394 million had been credited to the reclamation fund, the balance being accounted for as indicated above. Through June 30, 1957, the power revenues provided almost one-third of the income of the reclamation fund, and this proportion will increase, as currently over half of the funds coming into the reclamation fund are from power revenues. However, once the net revenues from the sale of power at any project have repaid the construction costs of the project allocated to be repaid by power revenues, the net revenues are to be deposited in the Treasury as miscellaneous receipts.

The Bureau of Reclamation operates substantial power transmission systems in the Central Valley of California, in Arizona, and in the Missouri River Basin, as well as isolated transmission lines in various other areas, for marketing power. On June 30, 1957, there were over 9,800 miles of transmission lines, all but about 10 percent of which operated at 69,000 volts or higher. The growth of the reclamation transmission line program is shown on table VI. As indicated thereon, about 60 percent of the transmission lines have been constructed since 1950. Substantial additions to the system will be required, principally in the Missouri River Basin, to market power from all the authorized projects.

TABLE VI.—*Circuit-miles of electric power transmission lines operated by the Bureau of Reclamation* [1]

Year	Total lines added previous period	Cumulative total	Year	Total lines added previous period	Cumulative total
1935	[2] 521.54	521.54	1950	1,541.29	3,944.45
1940	578.58	1,100.12	1955	5,160.95	9,105.30
1945	1,303.12	2,403.16	1957	749.95	9,855.25

[1] From statistical appendix, report of the Commission of Reclamation.
[2] From inception of program through 1935.

MUNICIPAL AND INDUSTRIAL WATER SUPPLY

A third major physical accomplishment of the reclamation program is the supplying of water for municipalities and industries. Contracts for this type of water service were first authorized for towns on or in the vicinity of Federal irrigation projects by the Town Site Act of April 16, 1906. The growth of municipal water service from reclamation projects was slow. In 1920 the Secretary's authority was broadened to permit sale of water for any purpose other than irrigation upon a showing that there was no other practicable source of water supply for the purpose. Statistics on the contracts under the 1906 and 1920 acts were not kept separately, however, and it is difficult to show quantitatively the growth of this portion of the reclamation program. No interest on costs allocated to municipal water supply purposes was charged under these acts, and terms and conditions of the contracts were generally the same as those on contracts for delivery of irrigation water. In some cases the municipal water supplies were taken from irrigation canals under the irrigation repayment contract. However, many of the important projects of the Bureau of Reclamation which serve municipal water supplies were authorized during the period when these acts provided the necessary authority for contracts, without there being any provision for handling municipal water contracts on any different basis than the irrigation water supply contracts.

With the multiple purpose approach authorized by the Reclamation Project Act of 1939, the furnishing of water for municipal and other miscellaneous purposes became a fully recognized purpose of Federal reclamation project development, with authority being given for long term contracts, cost allocations to municipal water supply, and interest at a rate not to exceed 3½ percent on costs allocated to municipal water supply. The contracting for the sale of water for municipal

supplies remained subject, however, to a finding by the Secretary of the Interior that such contracts would not impair the efficiency of the project for irrigation purposes. Under the authority of the 1939 act, several projects having the furnishing of water supplies for municipal purposes as one of the primary purposes, were undertaken, notably the Cachuma, Solano, and Ventura projects in California. In 1949, the Congress authorized the Canadian River project in Texas, the largest project to date which has municipal water supply as the principal purpose, but the project has not yet been built. Since 1949, all contracts entered into by the Bureau of Reclamation for furnishing municipal water supplies have included provisions for interest on costs allocated to municipal water supply.

In 1957, the Bureau of Reclamation delivered over 850,000 acrefeet of water for municipal and industrial or other miscellaneous purposes. The Bureau had contracts to supply water for domestic or other purposes to over 200 municipalities or similar users, in addition to a great number of contracts to supply water for industrial and other purposes. Three-quarters of the Bureau's municipal water supply service is for the gigantic Metropolitan Water District of Southern California, which serves over 75 cities, including Los Angeles and San Diego, which have joined together in an effort to solve their water supply problems. The district incorporates a number of smaller municipal water and irrigation districts and public utility districts, and has built its own works to convey water from Parker Dam, which is a reclamation project, to the southern California coastal area.

Table VII summarizes the municipal, industrial, and other miscellaneous water supply activities of the Bureau of Reclamation.

In the Water Supply Act of 1958 [57] the Bureau of Reclamation, along with the Corps of Army Engineers, was given further broad authority to include storage in reservoir projects for existing or anticipated future demand or need for municipal or industrial water, and it is likely that the furnishing of municipal and industrial water supplies will be an ever increasing part of the reclamation program as the West continues to develop.

TABLE VII.—*Municipal, industrial, and other water uses* [1] *(exclusive of irrigation): Bureau of Reclamation projects, 1957*

Project and State		Water delivered or contractual allotment, 1957 (acre-feet) [2]
Arnold, Oreg.	Industrial or other	50
W. C. Austin, Oklahoma	City of Altus, Okla.	4,800
Belle Fourche, South Dakota	Municipal water supply for Newell, Vale, Nisland, and Newell field station.	336
Boulder Canyon, Ariz., Calif., Nev.:		
Lake Mead	Municipal water supply for Boulder City, Henderson, and Las Vegas and vicinity, Nevada.	20,400
Imperial Dam	Municipal water supply for Calexico, Holtville, El Centro, Imperial, Brawley, Westmoreland, Calipatria, Niland, Seeley, and Heber, Calif.	14,688
Cachuma, California	Municipal water supply for Goleta, Montecito city water District, and Santa Barbara.	3,516
Canadian River, Tex.	Project authorized but not yet undertaken to provide municipal water supply to Amarillo, Borger, Lubbock, Pampa, Plainview, and several other cities in the Texas Panhandle.	----------

See footnotes at end of table, p. 27.

[57] 72 Stat. 319.

TABLE VII.—*Municipal, industrial, and other water uses* [1] *(exclusive of irrigation): Bureau of Reclamation projects, 1957*—Continued

Project and State		Water delivered or contractual allotment, 1957 (acre-feet) [2]
Central Valley, Calif.	Municipal water supply for Orange Cove, Fresno City District No. 18, Buckeye City Water District, Shasta Dam Area Public Utility District, Summit City Public Utility District and Sacramento.	1,005
	Municipal water supply through Contra Costa County Water District for Antioch, Bay Water Co. Cal. W. S. Co., Contra Costa J.C., Gregory Gardens City Water District, Oakley City Water District, Pacifica H. S., Pittsburg, and other private groups.	18,821
	Industrial and other supplies through Contra Costa County Water District.	23,531
	Industrial and other water supplies from Central Valley project.	1,231
Colorado-Big Thompson, Colo.	Municipal water supply for Estes Park, Fort Collins, Loveland, Berthoud, Johnstown, Longmont, Lyons, Boulder, Greeley, and Mead.	38,680
	Industrial and other uses	2,100
Columbia Basin, Wash.	Municipal and industrial water supply including city of Ephrata and town of Quincy.	685
Crescent Lake Dam, Oreg.	City of Bend	5
Deschutes, Oreg.	Municipal water supply Bend, Redmond, Madras.	1,631
	Industrial and other uses	182
Gila, Ariz.	Municipal water supply for defense establishments.	570
	Industrial and other uses	1,400
Huntley, Mont.	Municipal water supply for Huntley, Ballantine, Pompeys, Pillar, and Worden.	353
Klamath, Oreg.-Calif.	City of Klamath Falls	273
Lewiston Orchards, Idaho	Municipal water supply for suburban area of Lewiston Orchards.	410
Lower Yellowstone, Mont.-N. Dak.	Municipal water supply for Fairview and Savage.	120
	Industrial and other uses	2,400
Mancos, Colo.	do	39
Milk River, Mont.	Municipal water supply for Havre and Chinook.	2,812
	Industrial and other uses	4,800
Missouri River Basin	Municipal water supply for Dickinson, N. Dak., Rapid City, S. Dak., Norton, and Russell, Kans.	3,936
Newlands, Nevada	Municipal water supply for Wadsworth, Nev.	1,100
	Industrial and other uses	3,600
Ogden River, Utah	Municipal water	1,512
	Industrial and other	34,541
Parker Dam, Ariz.-Calif., and other Bureau of Reclamation works.	Municipal water supplies through Metropolitan Water District of Southern California, which originally served the following cities: Anaheim, Beverly Hills, Burbank, Compton, Fullerton, Glendale, Long Beach, Los Angeles, Pasadena, Santa Marino, Santa Ana, Santa Monica, and Torrance. The Metroplitan Water District of Southern California now also includes the following districts and cities: Central Basin Municipal Water District, 13 municipalities; Eastern Municipal Water District, 3 municipalities; Western Municipal Water District, of Riverside, 3 municipalities; West Basin Municipal Water District, 10 municipalities; Orange County Municipal Water District, 13 municipalities; China Basin Municipal Water District, 5 municipalities; Coastal Municipal Water District, 5 municipalities; Pomona Valley Municipal Water District, 5 municipalities; San Diego County Water Authority, including 7 cities, 7 other municipal water districts, 4 irrigation districts and the Fallbrook Public Utility District.	594,033
Pine River, Colo.	Municipal water supply for Ute Agency	53
Provo River, Utah	Municipal water supply for Salt Lake City, Provo, Orem, Lehi, Pleasant Grove, Lindon, and American Fork.	17,938
	Industrial and other supply	5,508
Rio Grande, N. Mex.-Tex.	City of El Paso	1,200
Riverton, Wyo.	Town of Pavillion	50
Salt River, Ariz.	City of Phoenix	43,690

See footnotes at end of table, p. 27.

TABLE VII.—*Municipal, industrial, and other water uses* [1] *(exclusive of irrigation): Bureau of Reclamation projects, 1957*—Continued

Project and State		Water delivered or contractual allotment, 1957 (acre-feet) [2]
Solano, Calif.	Municipal water supply for Fairfield, Suisun, Vacaville, and Vallejo; and defense establishments.	
Shoshone, Wyo.	Municipal water supply, Powell, Deaver, and Cowley.	1,287
	Industrial and other	6
Uncompahgre, Colo.	Municipal water supply	870
Ventura, Calif.	Municipal water supply for Ventura and 8 other municipalities served by the Ventura River Municipal Water District.	
Washita, Okla.	Municipal water supply for Fort Cobb, Anadarko, Clinton, Bessie, Cordell, Clinton-Sherman Air Force Base, Rocky, and Hobart.	[3](19,300)
	Industrial water supply	[3](1,500)
Weber Basin, Utah	Municipal water supply for Ogden, South Ogden, and 19 other municipalities.	[3](18,284)
	Industrial water supply for Salt Lake Refining Co.	[3](2,750)
Yuma, Ariz.-Calif.	Industrial and other	80
Total		[4] 854,242

[1] Information furnished by the Bureau of Reclamation, Dec. 5, 1958.
[2] 1 acre-foot is 325,800 gallons.
[3] Under contract, but project not complete, no water delivered in 1957; figures not added in total for 1957.
[4] 278,000,000,000 gallons.

RECREATION

Along with the accomplishments of the reclamation program in the fields of irrigation, hydroelectric power, and municipal water supply, has come an ever-increasing use of reclamation reservoirs for recreational purposes. With the trend toward urbanization in the United States today, the importance of outdoor recreation is increasing year by year.

Statistics released by the Bureau of Reclamation in 1956 show that 140 reclamation reservoirs having a surface area of over 1,300,000 acres are available for fishing, hunting, and other outdoor recreational activities. The Bureau's statistics show that their facilities were used by almost 10 million visitors in 1955, and that usage has increased to about 12 million annually at the present time, in line with the tremendous surge of interest in outdoor recreation all over the country.

At the 140 reservoirs on which statistics have been compiled by the Bureau, facilities for the following activities are available:

TABLE VIII.—*Recreation facilities at reclamation reservoirs, 1955*

Activity	Number of reservoirs
Picnicking	93
Camping	66
Swimming (developed or designated beaches)	33
Boating (launching ramps or landings)	92
Rental boats available	64
Lodging	81
Cabin sites for lease	47
Clubhouse sites for lease	35
Organized camping areas	23
Fishing	132
Hunting	115

The projects themselves are dominant attractions in some cases, and the attendance figures include roughly 3 million visitors to the giant Hoover Dam, highest dam in the United States, and a half million at Grand Coulee Dam, the largest concrete structure in the world. Public attendance of over a million was recorded at Jackson Lake which is located within the Grand Teton National Park, and well over a half million at Buffalo Bill Dam in Wyoming, which is on one of the main approaches to Yellowstone National Park.

CONCLUSION

Numerous other physical accomplishments of the reclamation program could be cited, including, but not limited to, flood control storage, navigation releases, wildlife management areas, and water storage to meet international obligations. But the foregoing is considered a sufficient background for the later chapters on the contributions of the reclamation program to the economy of local areas, the West, and the Nation.

III. Contributions to the Economy of the West

THE WEST IN 1900

At the inception of the Federal reclamation program, the economy of the Western United States was underdeveloped in relation to the rest of the country. One of the last great battles with the Indians, the Battle of The Little Big Horn, where Custer made his last stand, had been fought a mere quarter century before, in 1876. Only 14 of the present 17 Western States had achieved statehood; Oklahoma was not admitted to the Union until 1907, and Arizona and New Mexico did not become States until 1912.

It was not until the three decades immediately preceding 1900 that the vast areas west of the 97th meridian began to be occupied by any considerable number of permanent settlers; in 1860 the area between the 97th meridian to the fringe of settlement along the west coast contained only 1 percent of the population, although it included approximately one half the territory of the United States. By 1900, the census showed a total population of 11,187,961 in all the 17 Western States; 14.7 percent of the national total of 75,994,575. The distribution of population among the Western States in 1900 is shown on table IX, together with 1957 estimates of population.

Table IX.—*Population, 17 Western States*

State	1900	July 1, 1957 [1]	State	1900	July 1, 1957 [1]
Arizona	122,931	1,078,000	South Dakota	401,570	693,000
California	1,485,053	13,879,000	Texas	3,048,710	9,175,000
Colorado	539,700	1,663,000	Utah	276,749	840,000
Idaho	161,772	645,000	Washington	518,103	2,725,000
Kansas	1,470,495	2,100,000	Wyoming	92,531	317,000
Montana	243,329	671,000			
Nebraska	1,066,300	1,437,000	Total	11,187,961	40,943,000
Nevada	42,335	262,000	Total United States	75,994,575	170,293,000
New Mexico	195,310	813,000			
North Dakota	319,146	645,000	Percentage in 17 Western States	14.7	24
Oklahoma	790,391	2,257,000			
Oregon	413,536	1,743,000			

[1] Source: U.S. Bureau of the Census. Series P. 25, No. 186, Oct. 27, 1958.

The people who settled the West were chiefly miners, ranchers, and farmers, lured by discoveries of rich deposits of minerals and by opportunities to exploit free grass and to open fertile farming areas. The process was speeded by favorable land laws, by a rapidly increasing immigration, and particularly by the building of the great transcontinental railroads, the invention of barbed wire, and the quantity production of windmills.

Industrial development in the West was based almost entirely on the extraction of raw materials. Production of cattle for the market has continued to be an important industry in the West, although by the 1900's the ranchers' frontier had given way to the advancing farmers' frontier. Agriculture continued to expand westward, although the frontier had ended in 1890. Production of wheat increased in the Red River Valley, the Kansas-Nebraska area, the Dakotas, and the Oregon-Washington area in the 1890's, and showed a decline only in California, where more intensive farming took over. The Corn Belt also showed limited expansion toward the West, followed by hog production and the slaughtering of hogs. The latter years of the 19th century saw a tripling of cotton production in Texas and a few years later a similar advance in Oklahoma. While areas on the east coast and in the Middle West near the great concentrations of population maintained or increased their truck gardening and fruit growing, the great advances came in California and Florida.

As agricultural production in the West changed from the initial self-sufficing efforts to the extensive commercial type, and then, in some areas, to the more intensive commercial speciality-crop development, water supply loomed ever larger as a factor limiting agricultural development. By 1900, about 7.5 million acreas of land had been irrigated, entirely by the use of private capital. However, many irrigation company bonds were in default, and further irrigation development appeared at a standstill.

GROWTH OF IRRIGATION

It was only after the introduction of Federal reclamation projects, that the growth of irrigation developments financed by private capital resumed, and the West soon grew to be a dominant factor in several types of agricultural production. Since that time, the irrigated area of the West has more than quadrupled. Only a little over one-eighth of the increase in new lands is on Federal reclamation projects, but in addition, the Federal projects furnish water to an equal amount of land which had an insufficient water supply from other sources, greatly increasing their productivity. The distribution of irrigated lands among the States in 1901 is shown on table X, along with 1957 irrigated acreages, including figures showing areas irrigated by reclamation projects in 1957. It will be seen from the table that the percentage of land in reclamation projects as compared to the total increase in irrigated area since 1900 ranges from about 1 percent in Kansas to almost 99 percent in Colorado.

TABLE X.—*Irrigated acreage, 17 Western States*

	Total irrigated acreage			Irrigated area,[3] Federal reclamation projects, 1957			
	1900 [1]	1957 [2]	Increase	Full service	Supplemental and temporary service	Total	Percentage of increase served by Bureau of Reclamation
Arizona	185,396	1,150,000	964,604	275,759	64,987	340,746	35
California	1,446,119	7,750,000	6,303,881	676,699	671,118	1,347,817	21
Colorado	1,611,271	2,501,000	889,729	97,694	781,647	879,341	99
Idaho	602,548	2,455,113	1,852,565	408,121	1,004,102	1,412,223	76
Kansas	26,497	844,000	817,503	8,608	0	8,608	1
Montana	970,231	1,900,000	929,769	251,591	0	251,591	27
Nebraska	148,538	2,395,000	2,246,462	204,920	92,016	296,936	13
Nevada	504,168	735,000	230,832	55,240	50,054	105,294	46
New Mexico	204,508	873,000	668,492	198,179	896	199,075	30
North Dakota	5,202	[4] 48,000	42,798	26,489	0	26,489	62
Oklahoma	2,761	294,684	291,923	39,890	0	39,890	14
Oregon	388,198	1,606,500	1,218,302	307,550	104,783	412,333	34
South Dakota	43,010	135,000	91,990	65,727	6,729	72,456	79
Texas	[5] 451,130	6,962,234	6,511,104	50,705	9,745	60,450	9
Utah	629,273	[4] 1,200,000	570,727	15,760	260,033	275,793	48
Washington	135,936	1,002,000	866,064	435,208	164,753	599,961	69
Wyoming	606,942	1,400,000	793,058	201,285	26,978	228,263	36
Total	7,961,728	33,251,531	25,289,803	3,319,425	3,237,841	6,557,266	26
U.S. Total	7,978,820	36,537,355	28,558,535				

[1] From H. Rept. 1468, 57th Cong., 1st sess., "Reclamation of Arid Lands."
[2] From "Irrigation, Engineering and Maintenance," Aug. 31, 1958.
[3] From "1957 Crop Report and Related Data," Bureau of Reclamation, July 11, 1958.
[4] 1956.
[5] "1910 Census of Agriculture" (the Reclamation Act was extended to Texas in 1906, but no Federal projects had been built in Texas by 1910).

A great deal of irrigation development would have taken place in the West without a Federal reclamation program, but there seems to be wide agreement that the Federal program operated as a catalyst, as indicated by recent official reports on water development in the United States. The President's Water Resources Policy Commission, for example, had this to say in 1950:

> Had it not been for the big and little reclamation projects, the West as we know it today would not exist, for impounded water alone makes possible not only agriculture, but the very life of the people in this vast semiarid region. The building of regional and national economies, enhancing social values and improving living conditions for people, is the primary if not the only reason for the investment of public funds in water resources projects.[58]

And in 1955, the Second Hoover Commission pointed out the value of the Federal reclamation program in these words:

> The justification for Federal interest in irrigation is not solely to provide land for farmers or to increase food supply. These new farm areas inevitably create villages and towns whose populations thrive from furnishing supplies to the farmer, marketing his crops, and from the industries which grow around these areas. The economy of seven important cities of the West had its base in irrigation—Denver, Salt Lake City, Phoenix, Spokane, Boise, El Paso, Fresno, and Yakima. Indeed these new centers of productivity send waves of economic improvement to the far borders, like a pebble thrown into a pond. Through irrigation, man has been able to build a stable civilization in an area that might otherwise have been open only to intermittent exploitation.[59]

[58] The report of the President's Water Resources Policy Commission, "A Water Policy for the American People," 1950, vol. 1, p. 152.
[59] Commission on Organization of the Executive Branch of the Government, "Water Resources and Power," H. Doc. 208, 84th Cong., 1955, p. 44.

CONTRIBUTIONS OF INDIVIDUAL PROJECTS

It is difficult to measure quantitatively these general contributions of the individual projects to the West. However, it appears from a study of past population growth rates that counties with reclamation projects increase at a rate at least five times as fast as less favored nearby counties. Unfortunately, not many objective analyses of the part which Federal reclamation has played in such growth have been made.

There can be little doubt that the reclamation projects serve as local organizing cores, economic and social. They are important factors in area development—catalysts of a fuller economy. They are the foci of homes and villages for people and their multitudinous activities. They are a base for development and utilization of the resources of a much wider area—i. e., winter feed and hay to maintain and perhaps fatten the livestock which graze the Federal forests and rangelands during the warmer part of the year. Such projects provide continuity of production; there is less fluctuation from year to year; there is no recurring but irregular periodic disaster, as from drought. Diversification is easier—truck crops and fruit are prominent among those grown. Multiple cropping is common on some of the projects having long growing seasons.

It must not be thought that these reclamation communities are wholly without problems, even serious ones. On some projects, the growing season is short, thus restricting the crops that can be feasibly grown, and limiting production to one crop per year. Not all of the soils are adequately adaptable—alkali and drainage problems may seriously affect portions of some projects. Some are the problems of newness; others may not show up until after years of more or less profitable operations. Some projects, it would appear, may have been too strictly agricultural, at least in the earlier years. Settlers have in some instances possessed inadequate financial reserves to carry out a good program of initial development. Others have been inadequately selected or experienced. But these are problems which are experienced elsewhere, under nonirrigated agriculture.

The water supply on some projects in some years appears to have been inadequate for the full area developed. In some instances the water rights associated with prior appropriation for beneficial use may mean that better land may have relatively inferior water supplies during years of scarcity. Problems of priority for urban and industrial water supplies also arise, requiring the taking of land out of production. Some of these problems have been worked out, but many remain. Agricultural depressions in the general economy during the 1920's and 1930's proved to be a very severe handicap to irrigated areas, as they did to most other sectors of our farm economy. Markets for many of the products tend to be comparatively distant—thus putting a premium on high quality and reduction of bulk—adjustments which not infrequently prove to be competitively advantageous in the long run. With recent technological advances, questions have arisen repeatedly in regard to the adequacy of unit farm sizes. Misjudgments and unexpected costs plus inflation have resulted in a heavier burden of repayment than anticipated during the planning stages. Certainly the situation is one which emphasizes the need for, and the high

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desirability of, careful investigation and planning prior to the almost irrevocable steps involved in the establishment of the project.

As the economic effects of reclamation projects on the local economy are explored for particular projects, it must be kept in mind that some benefits are not susceptible to monetary evaluation. These include such intangibles as effect on community welfare, stabilization of the regional economy, psychological effect on project settlers, and the contribution to national security of increased productive capacity. Apart from intangibles, the production of agricultural commodities results in economic activity which contributes to the national income; this contribution to national income, as it accrues within the local economy, is presumably subject to measurement, crude though it may be.

Students have tried to measure the relationship between land reclamation and the indirect benefits to the local economy of development, including the creation of new businesses, new jobs, and new homes. The problem is, in its very nature, a most difficult one, especially if quantitative answers are required. Some of the studies which have been made will be reported on briefly here.

The Payette project, Idaho

The question of how much income will accrue within an area which, by irrigation, is transformed from sagebrush desert into an area of intensive agriculture, was studied by Marts in the Payette area of southwestern Idaho.[60] He found a ratio of direct to indirect benefits of 1.00 to 1.27, i.e., that for each $1 of net income or direct benefit accruing to the farm segment of the local population, the total benefit realized, or income generating effects of such primary production within the local economy, is $2.27, of which total the nonfarm segment realized $1.27. On the basis of this experiment, he concluded that the economic processes associated with reclamation unquestionably yield an even higher indirect benefit factor on a regionwide basis.

The Oahe project (proposed), South Dakota

Findings by South Dakota State College on the potential contribution to the economy of the State of South Dakota by the Oahe project, a part of the Missouri River Basin project, now undergoing detailed investigations, were reported as follows:

> The proper water resource development would stabilize the State's agricultural production and would minimize the effects of droughts. * * *
>
> Data covering 88 years in this, and the immediate adjoining area, show that during 28 percent of these years the crops produced ranged from total failure to such low yields as to bring some degree of want and privation to the farmers. * * *
>
> It has been estimated that with irrigation in the proposed Oahe project stabilization will come, not only to the 500,000 or more acres to be irrigated but also to an additional 3 million acres, broken down about as follows, 1,500,000 acres directly integrated with irrigated lands, 250,000 acres producing some supplemental feeds in normal years, and 1,250,000 acres will have a feed supply in drought years. This will occur because the Oahe project lands are surrounded by hundreds of thousands of acres producing feeder livestock and these livestock will flow to the project lands for feeding and maintenance and some feeds from the project will go out to the surrounding areas.

[60] Marts, M. E. "An Experiment in the Measurement of the Indirect Benefits of Irrigation—Payette, Idaho." Prepared for Bureau of Reclamation, U.S. Department of the Interior, region 1, Boise, Idaho, Idaho, June 1950. 42 pp.

The crops coming off of land receiving water from the development will be mainly livestock feed, such as alfalfa, grass, pasture, and corn.

* * * * * * *

In addition to the stability that will come to agriculture, full water resource development will also:

1. Furnish adequate supplies of water for an increasing State population.
2. It will open up opportunities for people and will keep people in the State for all uses.[61]

The Central Valley project, California

The Bureau of Reclamation studied the contributions of the partially completed Central Valley project of California for 1953, one of the better agricultural years.[62] It was found that the project provided some 1,500,000 acre-feet of water, about 70 percent of the crop irrigation requirements of the 720,000 acres then served by the project. Value of crops and livestock attributable to project water in that year was estimated at $152 million, or about one-eighth of all cash farm income in the valley. The project farms and associated processing, packing, and transportation provided work for a maximum of nearly 40,000 workers. About 50,000 persons in the local communities were engaged in servicing industries. Resultant purchasing power included $35 million net income to project farmers and an estimated $54 million in wages to employees on farms and in collateral industries. This provided a market (estimated) for $40 million in automobiles, $10 million in farm implements, $13 million for apparel, $25 million for gasoline and $15 million in furniture, household equipment and home appliances, plus an estimated $7,300,000 paid in Federal personal income tax—about three times the amount paid for project water in that year. Farmers and their employees paid over $1,800,000 in State retail sales and personal income taxes, and some $2 million more in county property taxes than they would have without the project. The railroads hauled out 21,800 cars of agricultural commodities attributable to project water and hauled in 12,000 cars of merchandise from the rest of the Nation to farmers and others benefiting from the project, receiving an estimated $20 million in revenues.

About 500,000 acres of irrigated land served by the project which would probably have reverted to dry-farmed land or pasture without project water, retained a market value of some $200 million more than they would have had without project water, and over $60 million in value had been added to dry lands furnished a full water supply by the project. Three new towns were born near Shasta Dam and one at Friant Dam, all of which are still thriving as a result of the project.

And all this had been accomplished by the expenditure, by the end of 1953, of some $400 million in planning and constructing the project, most of which will eventually be reimbursed from revenues from the sale of water and power.

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[61] Statement of Dean A. M. Eberle of South Dakota State College, Public Works Appropriations, 1958. Hearings on H. R. 8909, Subcommittee of the Committee on Appropriations, U.S. Senate, 85th Cong., 1st sess., May 16, 1957, pp. 100-101.

[62] The "Contribution of Irrigation and the Central Valley Project to the Economy of the Area and the Nation," report by the Bureau of Reclamation for the use of the Committee on Interior and Insular Affairs, House of Representatives, Committee Print No. 11, March 1956.

Strawberry project (Utah)

Gov. George D. Clyde, of Utah, has recently reported on the benefits of one of the more successful of the early reclamation projects—Strawberry Valley:

A group of citizens worked 18 months seeking finances for the project. Unsuccessful, they appealed to the Federal Government for aid under the new Reclamation Act in 1904. The project was authorized in 1906, delivered its first stored water to farms in the summer of 1915—and water users have since repaid $2,678,072 to the Government, or 80 percent of the $3,349,424 repayment obligation.

* * * * * * *

The cumulative crop value from the time of completion to the present is $78,495,856 or 22 times the construction cost. In addition, the Strawberry produces power, municipal water, and recreation with an annual value of $500,000.

* * * the personal income directly associated with the project is estimated at $18 million a year. For the population growth in the area has been continuous while contiguous areas, comparable in soil and climate, but lacking sufficient water, have shown population and income declines. Utah County, in which the Strawberry project is located, grew at the same pace as neighboring Juab and Sanpete Counties—until 1910 or thereabouts, when the water supply from natural streams was used at virtually its full potential. Since 1915, when the Strawberry began furnishing its first water, Utah County has gained in population, its neighbors have declined, losing purchasing power as well as residents.

Consumer studies by merchandising firms, Federal surveys and market-data reports indicate 12,000 people of the project area's present 24,000 population live in the county as a result of the Strawberry project.

* * * During the past 5 years there was an average annual sale of 658 new cars and 225 new trucks in the Strawberry project area. Total value $2,337,000. Farmers annually averaged purchases of 156 new tractors costing $263,860 and $235,500 in new farm implements. Two-thirds of these automotive and machinery dollars left Utah, directly aiding the laborer and the economy of Michigan, Ohio, Illinois, Indiana, New York, and California, and indirectly aiding stockholders of auto and farm-machinery companies throughout the Nation. Purchases of building materials, home furnishings, hardware, clothing, drugs, appliances, and general merchandise shipped to the Strawberry region from all across the Nation totaled $18 million in a recent typical year, of which $10 million left the State.

Continuing our statistics a bit further: The volume of sales involved in interstate shipment specifically attributable to the project amounts to $8,232,000 of which $4,512,000 leaves the State annually. Over $1 million more in products is thus purchased annually from Eastern and Midwestern States than the original cost of the project. And while the population of Utah County rose steadily past the 24,000 mark, the population of neighboring Sanpete County leveled off just about 15,000 in 1920 and has since dropped below the 14,000 mark. Juab County reached a population peak of 10,000 and now has but 5,100 residents.

In part, Utah County's current well-being stems from new industrial plants such as the war-built United States Steel plant at Geneva as well as farm prosperity. This industrial growth was possible only due to water, power, and population resources stemming from the Strawberry project.

Finally, there's the matter of taxes. From 1915 to 1920, the first 5 years of the project, the assessed valuation of the project area jumped from $7,476,837 to $26,890,840, a rise directly attributable to the Strawberry. As for recent years—in 1954—with the project creating jobs and livelihoods which now support 12,000 persons, the total in taxes collected from all sources amounted to $149.83 for State and local taxes and $369.40 for Federal purposes per person. Multiplying these by 12,000 we find the project returning $1,797,960 to the State and local governments and $4,432,800 to the Federal Government in a single year.

From an investment of some $3.33 million over 40 years ago, the Federal Treasury now receives nearly $3.4 million annually in tax revenues. Not a bad return from an investment in water, land, and people. * * * [63]

Other project studies

An analysis of retail sales in the three county areas of the Klamath project, along the Oregon and California border shows that per capita

[63] Congressional Record, Apr. 15, 1958, pp. A3337-A3338.

sales in the project area were larger than retail sales in either Oregon or California, and some 20 percent larger than in the United States as a whole.[64]

A study of the Yuma and Gila projects in Arizona and California found an additional net income of $1.74 accruing to local supporting business, service establishments, employees, etc., indirectly attributable to each dollar of farm income and wages to farm labor.[65]

A study of the situation in Weld County, Colo., and on the Newlands project gave results very similar to the Payette study.

SECONDARY BENEFITS

The importance of some of the broader secondary benefits of reclamation projects, in addition to those customarily mentioned, has been pointed out by the Federal Reserve Bank of Kansas City in a recent study on economic analysis of water resource development projects:

> In addition, a benefit attributable to the project may arise out of the fact that an expansion of the market in a sparsely populated or low income area may contribute generally to efficiency of production by making possible a more extensive division of labor.
>
> Another source of secondary benefits due to external economies can arise in the field of social overhead capital. Facilities such as schools, roads, utilities, and other urban social capital may have excess capacity and thus be subject to decreasing costs as their use expands. The fuller use of social overhead capital is a legitimate secondary benefit attributable to a project. These types of secondary benefits may be of great importance in specific projects. Although their effects are invariably difficult to trace, they are nevertheless quite tangible.
>
> * * * The third and final variety of secondary benefits is much more difficult to conceptualize and no adequate means of measuring these benefits exists as yet, although in many cases they may well be the most important of the three. This variety of benefit may be termed "dynamic" or "developmental." Such benefits do not depend upon adjustments leading to more efficient allocation of a given stock of resources, but rather arise from the dynamic social engineering aspect of resources development. These benefits are based upon the development of more skilled labor and the introduction of advanced techniques and capital, which will convert the underutilized resources of the area to optimal employment. The type of reasoning which stresses this type of dynamic benefit has been basic to much of the recent literature on underdeveloped countries, but it has also long impelled many proponents of resource development programs in the less highly developed areas of our own country. The benefits which such social and economic engineering might yield are potentially tremendous, but unfortunately economic science has not developed to the point where accurate measurement is possible.
>
> Two other sources of secondary benefits falling loosely into this category of dynamic effects of resources development projects may be mentioned. The first is sociological as well as economic. The migration of population within the country in the last decade or so reveals an area preference which is gradually moving the center of population westward. If such a movement continues, the productivity of human resources in the areas experiencing large population increases will fall unless the population movement is accompanied by a transfer of capital and the careful development and husbanding of resources, including water. The portion of the population which has gone west has demonstrated its mobility and presumably, under conditions of economic stress, could be forced to return. Yet, the provision of employment opportunities in areas which offer the amenities of living which attract people to them increases satisfaction just as surely as any policy which enhances the gross national product as ordinarily measured. Needless to say, this effect of development projects is highly speculative and currently no means of measuring it exist.
>
> Secondly, resource development has long been supported by conservationist ideas. Conservation policies are ordinarily designed to make a greater provision

[64] "A Half Century of Progress on the Klamath Federal Reclamation Project," Committee Print No. 7, Committee on Interior and Insular Affairs. U.S. 85th Cong., 1st sess., May 1957.

[65] U.S. Bureau of Reclamation, Department of Interior, "Evaluation of Local Irrigation Accomplishments, Yuma and Gila Projects' Trade Area, Arizona and California, 1951."

for the future than the market mechanism (or any procedure based upon the imputation of market values) would demand. Resources development projects present the opportunity of providing very durable, in some cases almost perpetual, additions, to the Nation's capital stocks. It may be presumed that this capital usually will grow in value as population and the economy expands.[66]

Numerous other viewpoints could be cited, but without going further, it can probably be stated without equivocation that the contribution of the Federal reclamation program to the economy of the West far exceeds the mere value of crops and other vendible products produced.

IV. Contributions to the National Economy

The line between contributions to the economy of the West and contributions to the national economy is a hard one to define. On the one hand, it is generally agreed that strengthening the economy of any one part of the Nation helps strengthen the whole. On the other, from a strictly regional viewpoint, it has been argued that Federal stimulus to the agricultural and industrial economy of the West results in attracting such development away from regions not so stimulated. However, there is also the argument[67] given in the debate on the original Reclamation Act, that, had such views been dominant in the formulation of Federal policies bearing on development of our country, they would have precluded any internal improvements by the Federal Government. For example, there would have been no improvements for navigation, flood control, or other developmental purposes, or any Federal policies which tended to help one area or segment of industry.

As for the contributions which the Federal reclamation program makes, Arizona, where roughly a third of the irrigation development after 1900 was Federal, probably serves as the best illustration. In the words of a leading agricultural economist from that State:

> The growth of Arizona as a Territory, and later as a State, has been closely associated with the development of irrigation. From 1900 to 1947 the acreage receiving irrigation water increased about fourfold, from 200,000 acres to 775,000 acres. In that time the population increased sixfold, from 123,000 in 1900 to an estimated 700,000 in 1947. The development of irrigation has been costly. At times it appeared that the expenditures were unnecessarily large and that public and private money was being wasted, but now that the system has been developed neither the State nor the Nation would want to do without the irrigation or the population and the business economy which this irrigation development supports. The net result has been the development of the 48th State—a State which has contributed much to the entire Nation by extending the climatic range of the country, by providing an area for wholesome relaxation, recreation, and physical recuperation for many Americans. From an agricultural point of view the irrigated acreage developed has supplied in part the food required by this growing population, and has provided America with winter vegetables and other specialties, many of which cannot be produced in most parts of America.[68]

This appraisal, made more than 10 years ago, has not become obsolete with time—instead acreage under irrigation has increased to 1,150,000 and population to 1,078,000 in 1957, apparently the fastest growing State in its region.

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[66] Monthly Review, Federal Reserve Bank of Kansas City, October 1958, pp. 15-16.
[67] See ch. I, pp. 16-17.
[68] Barr, Dr. George W., University of Arizona, Senate Committee on Public Lands, 80th Cong., 1st sess., on S. 1175, "Bridge Canyon Project," June 23-30, July 1-2, 1947, p. 185.

CROP PRODUCTION

Probably the most objective way to look at reclamation's contribution to the agricultural economy of the Nation is by comparing production of agricultural commodities on reclamation farms with production of the Nation as a whole. This is shown on table XI, where the value of crops produced on projects served by the Bureau of Reclamation are tabulated and compared with the Department of Agriculture's figures on value of national production. Both sets of figures tend to be approximations, the national totals being taken from a preliminary report that omits some crops which are of minor importance nationally, but which are more important in the reclamation area. However, they are good enough to indicate the rough magnitude of Federal reclamation's contribution. Naturally, there are great variations from year to year, both in the gross value of national production of any given crop, and in the value and percentage produced on reclamation projects.

TABLE XI.—*1957 gross crop values, Federal reclamation projects and national totals*

[In thousands of dollars]

Crops	Total value of national production [1]	Gross crop value produced on projects served by Bureau of Reclamation [2]	Percentage of U.S. total produced on reclamation projects
Field, forage and miscellaneous crops:			
Cereals:			
Corn	$3,991,111	[3] $22,917	0.58
Wheat	1,839,440	40,087	2.18
Oats	803,493	7,007	.87
Barley	379,529	29,895	7.9
Rye	29,187	144	.49
Rice	217,087	838	.38
Sorghums	586,045	8,074	1.38
Other cereals	8,315	4,595	----------
Forage:			
Alfalfa and other hay	2,286,350	109,334	4.78
Irrigated pasture	(4)	28,487	----------
Silage or ensilage	(4)	12,649	----------
Crop residues and other forage	(4)	5,046	----------
Miscellaneous field crops:			
Cotton, lint:			
Upland	1,762,889	130,293	7.4
American-Egypt	24,010	10,497	43.7
Cotton, seed (all kinds)	230,244	17,745	7.7
Beans, dry and edible	111,951	30,830	27.6
Sugar beets	169,109	[5] 69,580	40.6
Broom corn	10,680	326	3.05
Hops	20,988	15,947	76.1
Peppermint and spearmint	12,016	3,633	30.3
Other miscellaneous field crops	[5] 2,219,421	78	----------
Seed crops:			
Alfalfa	39,147	11,719	29.9
Clover	29,254	3,498	11.9
Flaxseed	77,845	3,519	4.51
Grass	20,173	1,546	7.66
Pea	(4)	4,208	----------
Other seed crops	26,116	1,242	----------
Vegetables:			
Asparagus	17,372	3,972	22.8
Beans:			
Processing	55,545	1,707	3.1
Fresh market	47,052	1,078	2.30
Broccoli	14,076	617	4.39
Cabbage	40,862	1,169	2.87
Carrots	44,844	10,400	23.2
Cauliflower	14,654	10	.07
Celery	60,426	745	1.24

See footnotes at end of table, p. 38.

TABLE XI.—*1957 gross crop values, Federal reclamation projects and national totals*—Continued

Crops	Total value of national production [1]	Gross crop value produced on projects served by Bureau of Reclamation [2]	Percentage of U.S. total produced on reclamation projects
Vegetables—Continued			
Corn, sweet:			
Processing	$30,035	$2,717	9.22
Fresh market	50,008	2,721	5.44
Cucumbers	21,201	985	4.65
Greens (kale, spinach etc.)	16,079	98	.61
Lettuce	143,985	[3] 30,384	20.9
Cantaloupes, etc	61,075	12,600	20.6
Honey ball, honeydew	6,378	3,112	48.6
Watermelons	50,256	2,963	5.9
Onions, dry and green	60,076	[3] 8,240	13.2
Peas, green:			
Processing	50,238	1,967	3.9
Fresh market	2,781	355	12.8
Peppers (all kinds)	26,509	1,829	6.9
Potatoes, early and late	408,329	[3] 61,004	14.8
Sweetpotatoes	71,427	230	.32
Tomatoes:			
Canning	83,237	5,257	6.3
Fresh market	150,202	15,063	10.01
Other vegetables	35,763	3,280	----
Fruits and nuts:			
Apples	219,111	16,897	8.1
Peaches	130,134	10,289	7.9
Pears	62,589	10,503	16.8
Grapes	161,113	42,301	26.2
Cherries	47,997	5,003	10.4
Apricots	20,482	3,189	15.6
Prunes and plums	53,221	4,995	9.35
Olives	[4] 8,695	2,887	33.4
Dates	[4] 2,331	3,437	----
Oranges and tangerines	252,217	23,482	9.3
Lemons and limes	36,460	5,260	14.4
Grapefruit	51,540	7,351	14.2
Berries	89,775	1,035	1.15
Other fruits	21,261	875	4.1
Pecans	26,326	2,024	7.7
Walnuts	31,508	2,181	6.9
Almonds	[4] 18,696	1,295	6.9
Other nuts	3,708	35	.9
Total, crops listed above	17,694,034	889,981	5.0
Value of nursery production reported	----	8,130	----
Value of farm gardens and orchards reported	----	4,049	----
Total, reclamation crops	----	[7] 902,162	----
Payments for agricultural conservation practices	----	4,560	----
Federal payments, sugar beet program	----	14,971	----
Factory payments, sugar beet program	----	6,463	----
Total gross crop value reported by the Bureau of Reclamation	----	928,157	----

[1] From "Season Average Prices Received by Farmers and Value of Production, 1956 and 1957," Agricultural Marketing Service, U.S. Department of Agriculture, Dec. 17, 1957.
[2] From "1957 Crop Report and Related Data, Federal Reclamation Projects," Bureau of Reclamation, U.S. Department of the Interior, July 11, 1958.
[3] Includes seed.
[4] Not available.
[5] Includes field peas, soybeans, cowpeas, peanuts, velvet beans, tobacco, canes and sirups, mung beans and tung nuts, reported by Department of Agriculture, none of which are recorded as being produced on reclamation projects.
[6] Department of Agriculture has reported on California production only.
[7] Does not add because of rounding.

In the 1957 crop year, farms on reclamation projects marketed over 5 percent of the total value of crop production of the United States. This percentage, coming from about 2 percent of the Nation's cropland, attests to the value of an assured water supply on the good farmlands of the Western States.

As shown on the table, reclamation's contribution ranges from 75 to 100 percent of the Nation's production of such specialty crops as dates and hops, down through very substantial percentages of some of the fresh fruit and vegetable crops, to almost negligible percentages of some of the small grains and rice, and apparently none of the cane sirups, peanuts, tobacco, soybeans, and some other crops. By groups, reclamation projects in 1957 produced over 13 percent of the Nation's seed crops, and over 11 percent of its vegetables, but less than 1½ percent of the cereals. About 6 percent of other miscellaneous field crops are indicated as being produced on reclamation projects, but the crops are not comparable. Also, the values on hay and forage, important crops on most reclamation projects, are not reported in comparable fashion, so no conclusion can be drawn.

In particular, the value to our national economy of the fresh fruits and vegetables produced on these reclamation farms is worthy of special mention. Over the years, with our better means of handling fresh produce and rising standard of living, we in the United States are using more and more fresh fruits and vegetables. And this makes a very substantial contribution to the health of our people. Dr. Byron T. Shaw, Administrator of the Agricultural Research Service of the Department of Agriculture, declared that, while it was impossible to predict precisely what dietary changes and levels of income would prevail in the next 15 or 20 years, if the present trends continue, we would need to produce 43 percent more vegetables in 1975 than now, and that similar increases were expected in fruit consumption. Dr. Shaw also pointed out the increase in meat and meat products in our diets, citing the need for research on how to improve our forage crops from the standpoint of nutritive quality, disease, and pest resistance, and adaptability to soils and climate.[69] Clearly, the land in the Western United States has produced and will continue to play an important role in producing many of the foods demanded by our changing eating habits.

HYDROELECTRIC POWER

Measurement of the contribution to the Nation's economy made by hydroelectric power produced by Federal reclamation projects is likewise difficult. Statistically, power generated in the fiscal year ending June 30, 1957, at reclamation projects totaled 23.8 billion kilowatt-hours, about 4 percent of the national total of 612 billion kilowatt-hours. Installed capacity on reclamation projects was recorded at 5.1 million kilowatts, or 4 percent of the national total of 126.8 million kilowatts on November 1, 1957. Of the Nation's 26.9 million kilowatts of installed hydroelectric power capacity, 19 percent was on Federal reclamation projects.

A contribution of outstanding significance, and one which cannot be measured by the statistics alone, is the contribution which Federal reclamation has made to our national defense. The example of the aluminum industry, illustrates the point. Aluminum has proven to be vitally needed in the production of planes and other war equipment, and before the Second World War our national production was insufficient to permit the successful waging of large-scale war in the air.

[69] Talk before the northeastern branch of the American Society of Agronomy, at Beltsville, Md., June 20, 1956.

The War Production Board recognized this, and took action to correct the situation. In May 1941, the expansion goal of the aluminum industry was set at 1,400 million pounds of annual producing capacity. At that time the United States plants had 840 million pounds of producing capacity, and another 160 million already planned. The remaining 400 million pounds still had to be scheduled and huge quantities of electric power were required. The main problem was that of power; estimates were that it took 1,000 kilowatts of firm electricity for each million pounds of aluminum produced annually, or 400,000 kilowatts to meet the expansion goal. Private utilities had no such quantities readily available, nor did Niagara or TVA. The building of steam-generating plants was out of the question because of cost, material shortages, and the time required. The solution to this problem came because two great dams in the Pacific Northwest—Grand Coulee and Bonneville—were ready to provide the necessary power. And so a new aluminum industry was created in the Northwest. By the end of the war, almost 40 percent of the immediately usable primary aluminum capacity was in the Northwest. Secondary benefits resulted because of the breaking of a monopoly in the industry and the 25 percent wartime reduction in the price of primary aluminum.

The aluminum industry is only one example of the importance of this power made available by the program of the Bureau of Reclamation. The selection of Hanford, Wash. as the location of the plant to produce the plutonium needed for the development of the atomic bomb was in part due to the abundant source of power at Grand Coulee Dam. The production of basic magnesium in the quantities needed for our war effort was only made possible by the vast amount of power available at the Hoover Dam, which enabled us to construct the large magnesium plant at Henderson, Nev.

During the Korean war, again, reclamation power projects, along with those of the other Federal agencies, proved their worth in making possible the expansion of the electrometallurgical industries which provide the basic materials for so much of our military potential. In retrospect, these contributions cannot now be measured in dollars, but our mobilization planners would have been willing to place a high dollar value on them at the time when the output of these projects was available to meet our need.

INTERNAL REVENUE COLLECTIONS

The Western States make substantial contributions to Federal internal revenue collections. Out of about $80 billion collected by the Federal Government in fiscal 1957, nearly one-fifth came from the reclamation States, and the proportion is increasing. Since 1940, personal income in the West has increased from 19 percent of the national total to over 24 percent at present.

From time to time, attempts have been made to determine what Federal tax collections result from reclamation projects. The Bureau of Reclamation has made detailed studies of the economic development in counties having irrigation projects in relation to similar counties not so favored, in order to furnish the basis for an estimate of what part of the development could be traceable to the existence of the irrigated lands. Using these estimates, the Bureau has been

able to estimate roughly the increase in Federal revenue collections attributable to the various reclamation projects. As Federal tax collections are available only on a statewide basis, an allocation of the State total had to be made by counties. This was done on the basis of the proportion which the value of retail sales in each county bore to the statewide retail sales. Corporation taxes and miscellaneous Federal taxes were prorated on a national basis, as State collections of these taxes do not necessarily reflect business done in that State, as many corporations pay their entire Federal taxes in the State in which their main office is domiciled.

TABLE XII.—*Total Internal Revenue collections, fiscal year 1957* [1]

Arizona	$212, 696, 000	Kansas	$537, 436, 000
California	6, 643, 780, 000	Nebraska	431, 518, 000
Colorado	838, 209, 000	North Dakota	78, 869, 000
Idaho	131, 203, 000	Oklahoma	784, 356, 000
Montana	136, 374, 000	South Dakota	81, 578, 000
Nevada	97, 099, 000	Texas	2, 567, 739, 000
New Mexico	139, 139, 000		
Oregon	514, 746, 000	Great Plains, total	4, 481, 496, 000
Utah	192, 655, 000		
Washington	899, 366, 000	Total 17 irrigation States	14, 352, 451, 000
Wyoming	65, 688, 000		
West, total	9, 870, 955, 000		

[1] Includes individual income and employment taxes, also corporation income and profits taxes. Collections of revenue are not, of course, a perfect index as to the location and source of the productive economic activity. This defect would appear to be especially the case as regards corporation income and profits tax.

Using these methods, extended to many individual project areas, the Bureau determined that in the fiscal year ended June 30, 1957, Federal internal revenues estimated at $341,607,000 were collected from areas developed by Federal reclamation projects. This is substantially more than the direct payments on construction costs made by the water users, and might be used as another type of rough measure of the magnitude of reclamation's contribution to the national economy. Since 1940, the Bureau estimates that these payments totaled $3,218 million, somewhat in excess of total expenditures for project construction through fiscal year 1957.

As might be anticipated from the above, the Bureau of Reclamation's studies have indicated that per capita incomes from irrigated areas tend to substantially exceed the average for the State in which the project is found.

OTHER CONTRIBUTIONS

We have discussed these contributions to the Nation in the form of products and revenues; another possible measure would be the purchases of supplies and equipment and payments to labor arising from the reclamation program. All these have helped to create the large mass market on which we think our industrial efficiency is significantly dependent. The reclamation oases in the arid region also make their contributions to a more efficient long-haul transport network. Irrigation development, particularly of the large complex multipurpose sort now commonly involved in reclamation projects, contributes not only to power and industrial potential, but adds diversity to the scenic, recreational, and cultural complex of our country.

One of the more recent concepts of the reclamation program's place in the national economy is that of the importance of large-scale reclamation projects in a national public works program—something which can be speeded up when men and factories are underemployed, or cut back or delayed when inflation control is a paramount problem. Thus, the program conceived earlier as a national development program would now be considered part of a modern massive program to help stabilize, within limits, the business cycle. Clearly, this was one of the reasons for the vast expansion of the reclamation program in the 1930's, but, again, this is a contribution not susceptible to monetary evaluation.

Another newer value, apparently not truly envisioned a half century ago, appears highly important today. The settlement and development of our western area has provided us a key to power—not only uranium and other significant raw materials, but even more important—integrated and firmly held space. We are not an "east of the mountains" country; we span the continent and have our feet firmly implanted on the shores of the two great oceans. We are not a loose linking of marginal settlements—we have no dead never-never continental interior as does Australia.

Our vast country, fortunately, escaped the fracturing and splintering into smaller national units which is so evident in Europe. The knitting together of our Mississippi Valley and west coast, to which the reclamation program has contributed so much, gives us what some geopoliticians and military experts call defense in depth; partly a matter of room for maneuvering—space in which to absorb the shock, regroup, and recoil. Even more, it is a matter of survival value in dispersal, not only of essential industries, but of fields and launching facilities. It is this modern size, plus, of course, the accompanying diversity and abundance of most human and national resources within our own borders, which furnishes a major aspect of the structural and psychological underpinning of our military, economic, and political posture in our present unsettled world. A writer on geopolitics has put it in these words:

> While modern technology is rapidly revising the value of strategic locations the world over, it places an increasingly higher value on spaciousness. In this era of wars of materiel, when productive capacity overshadows any other consideration, big states have infinitely more chances for survival than small ones. Even a great productive capacity and ample natural resources do not alone suffice to achieve victory unless complemented by space in depth. * * * The United States and Russia, believed a hundred years ago to be too vast for effective control, have proved to be just the right size for modern states.[70]

V. Reclamation: Feasibility—Repayment—Costs

EARLY EXPERIENCE

At the inception of the Federal reclamation program, not too much attention was given to the development of any detailed set of principles to be followed for the determination of which projects possessed the highest degree of feasibility and therefore, presumably, should be among the first constructed. Nor was there at that time any clear attempt to differentiate between what is now referred to as financial

[70] Strausz-Hupe, Robert, "Geopolitics—The Struggle for Space and Power" New York, Putnam, 1942, pp. 190-191.

feasibility as against economic feasibility. The Reclamation Act of 1902 gave broad authority to the Secretary to investigate and to determine the practicability of proposed projects, to construct them, and to arrange for repayment by the settlers, without review by the Congress. Annual reports on the details of the program and its costs were required, but this only permitted an "after the fact" review.

Primary emphasis in the earlier years appeared to be placed on the engineering feasibility, and many mistakes were made on matters pertaining to the economic and agricultural aspects of the projects. These appeared largely to stem from lack of experience and deficiencies in the reclamation act, as pointed out by Clawson in a recent book:

> * * * The original act provided that a substantial proportion of the money received from the sale of public lands would be put into a special fund, from which Federal reclamation projects would be financed. It was thought that these receipts would be sufficient to finance as large a reclamation program as would be desirable. The act contained one unfortunate provision—that the money so obtained would be spent in the States from which it originated. This was interpreted, probably correctly, as requiring that one or more projects be built in each Western State. Thus, between 1902 and 1907, at least one project was begun in each of 16 States. Of the 27 projects begun before 1924, 21 were started in the years 1903–07. As a result, mistakes made on some of the first projects were repeated on others begun before it was realized that a mistake had been made. For instance, the need of careful soil studies, in order to irrigate only land capable of producing satisfactory crops, was not realized by the construction engineers, and several projects included large acreages of very poor soil. Another unfortunate result of this system of financing and of beginning many projects more or less simultaneously was that the revenues from the sale of public lands were insufficient to carry the construction program forward promptly * * *[71]

Overestimation of the repayment ability of the settlers was soon brought to the attention of the Congress, which found it necessary to extend the permissible repayment period to 20 years. At the same time, the program was placed under direct supervision of the Congress through a requirement that expenditures from the reclamation fund be made only after appropriations by the Congress in the annual appropriation acts. Earlier, approval of the President had been made a prerequisite for the starting of new projects.

But even these tighter provisions failed to eliminate all of the basic deficiencies in planning for new projects, and settlers continued to experience difficulties. The special advisers on reclamation in their 1924 report bore down rather heavily on this point:

> New projects or extensions of existing projects should be authorized only after full information has been secured concerning the water supply, engineering features, soil, climate, transportation, markets, land prices, probably acre cost of development, and other factors upon which the success of the project must depend. All such information should be secured by designated representatives of the Departments of the Interior, Agriculture, and Commerce, who should, after a careful investigation, make to the Secretary of the Interior a report upon the feasibility of the project or the extension of a project, having in mind primarily the creation of opportunities for actual settlement and farm homes upon the project, and repaying the total investment made by the Government. * * *[72]

The engineering feasibility of the earlier projects generally has escaped serious challenge, except for a few instances where the irrigation facilities were overbuilt in relation to the available water supplies, or where drainage needs were grossly underestimated or ignored. The Fact Finders Act in 1924 made additional investigations and

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[71] Clawson, Marion, "Uncle Sam's Acres," New York, Dodd, Mead & Co., 1951, p. 189.

[72] "Federal Reclamation by Irrigation," message from the President of the United States transmitting a report submitted to the Secretary of the Interior by the Committee of Special Advisers on Reclamation, S. Doc. 92, 68th Cong., 1st sess., 1924.

findings as to the agricultural feasibility and adaptibility of the projects a mandatory requirement prior to commencement of construction, and with the extension of the repayment period to 40 years in the Omnibus Extension Act of 1926, the basic deficiencies in the program authorized by the original act appeared to be taken care of.

ECONOMIC ANALYSIS

While there have been some problems arising on projects authorized since that time, the program generally is on a much sounder footing. Stemming largely from the procedures which evolved from the basic congressional policy statement on flood control, which provided for Federal participation in flood control "* * * if the benefits to whomsoever they may accrue are in excess of the estimated costs * * *," [73] the Bureau of Reclamation in the late thirties began to give more attention to the economic feasibility of proposed projects. The earliest computations of benefit-cost ratios by the Bureau used the increase in gross crop values attributable to the project as a measure of the benefits. Soon after the Second World War, more elaborate systems of computation of benefits were developed, based on computations of net benefits to the farmers and approximations, by various methods, of the net indirect and secondary benefits to other segments of the economy.

Numerous questions have been raised as to secondary benefits, particularly with respect to the detailed methodology of computation and the legitimacy of counting them at all. Some argue from the standpoint of the Nation, that during periods of full employment such benefits are offset by the neglect cost of alternate opportunities not developed. Most agree that during times of unemployment, construction of new reclamation projects does yield important net secondary benefits because alternative private investments probably would not be made. And everyone admits that such benefits do exist at all times for regions and localities, if not for the wider Nation.

Beyond the complex problems involved in earnest efforts to evaluate tangible benefits and costs, whether primary or secondary, are the more difficult imponderables, the so-called intangible benefits, including, among other values, those primarily scenic, recreational and wildlife, the strengthening of national security, the encouragement of a more widely dispersed industry, agriculture and population, and even, perhaps, according to some, the psychological values derived by society from the development of a region and from "balanced" development.

In a recent symposium on river basin development, a political scientist commented on the relationship of intangible benefits to economic evaluation of projects in these words:

> Another problem created by the heavy dependence upon benefit-cost analysis is the subordination of intangible benefits and costs in economic evaluation. These, it will be recalled, are benefits and costs which are not readily reduced to monetary equivalents. Often they are referred to as extramarket values. By whatever name they are called, they are real and often of great significance; and nearly all economists agree that they should be considered in project evaluation. * * * experience shows that agencies are unwilling to recommend projects with unfavorable ratios even when a strong case can be made for them on the basis of intangible benefits * * *, the emphasis which the agencies and

[73] Flood Control Act of June 22, 1936, 49 Stat. 1570.

Congress place upon benefit-cost ratios detracts from the consideration which important extramarket values might otherwise receive.[74]

CONSERVANCY DISTRICTS AS A MEANS OF RECAPTURING SECONDARY BENEFITS

While indirect and secondary benefits are still the subject of considerable controversy among economists and critics of the reclamation program, the procedures have been refined to the point where it has been possible, in some of the recent legislation authorizing new reclamation projects, to include a requirement that conservancy districts be formed and sign a contract prior to the construction of the irrigation distribution works to repay part of the project costs on the basis of the expected indirect and secondary benefits. Such districts usually include cities and towns in the vicinity of the irrigated area, and obtain their revenues from ad valorem taxes on all properties within the district.

NONREIMBURSABLE ALLOCATIONS

With the enactment of the Reclamation Project Act of 1939, as amended in 1946, the Secretary of the Interior was permitted to allocate a portion of the project costs to flood control, navigation, and preservation and propagation of fish and wildlife—such costs to be nonreimbursable. These provisions led to some abuses at first, as attempts were made to allocate the maximum possible amounts to nonreimbursable purposes so as to minimize repayment burdens. The spotlight was turned on this practice by a congressional investigation in 1952,[75] and since that time the Department of the Interior, with other affected agencies, has formally agreed on more equitable methods of cost allocation.

APPLICATION OF POWER REVENUES

Revenues from the very earliest hydroelectric power installations on reclamation projects were used to assist in repayment of project costs. In the absence of legislative requirements, no attempt was made to allocate costs, or to compute interest on the power investment—costs and repayments of all purposes were lumped together and interest on the power investment was not considered a cost. Then, in the Boulder Canyon project legislation, the Congress set up specific provisions calling for repayment with interest from power revenues of the entire cost of the dam, except for $25 million which was allocated to flood control and was to be repaid after the other costs had been amortized. Since that time, interest on the power investment on all projects has been considered a cost, at least for ratemaking purposes.

The 1939 Reclamation Project Act established general provisions for contracting for the disposal of power from reclamation projects, including a provision that power rates should be set at levels at least sufficient to pay interest at not less than 3 percent on the power investment, as well as operation and maintenance costs, and other fixed

[74] Marshall, Hubert, "The Evaluation of River Basin Development," in Law and Contemporary Problems—River Basin Development, School of Law, Duke University, vol. XXII, spring 1957, p. 250.

[75] "The Allocation of Costs of Federal Water Resource Development Projects," report to the Committee on Public Works, House of Representatives, by Mr. Jones of Alabama from the Subcommittee To Study Civil Works. House Committee Print No. 23, 82d Cong., 2d sess., Dec. 5, 1952.

charges deemed proper by the Secretary. The Solicitor of the Department, in a ruling on the Columbia Basin project frequently referred to as "The Solicitor's Opinion," determined, in effect, that the interest included as a part of the power rate base could be used as a part of the repayment of the irrigation costs allocated to be returned from power revenues. This opinion was incorporated into the policies of the Bureau of Reclamation, and for several years was used as a basis for showing repayment on existing projects and those under construction. In addition, a number of new projects were planned by the Bureau on the basis of the interest component, at least one of which was authorized by the Congress on that basis.

With the authorization of the vast Missouri Basin development, the Congress accepted the use of power revenues for the repayment of irrigation costs in excess of the repayment ability of the irrigators as being of basinwide applicability, and the basin account system of repayment was born. Under this system of repayment, all projects within a river basin are lumped together for repayment purposes. The basin account philosophy has been the subject of considerable controversy since its adoption, as there does not appear to be any real and valid reason why the power users in a region should be singled out to help repay irrigation costs. In 1950, a move was made to set up a basin account for the Columbia River Basin, but the legislation was not adopted by the Congress. However, in 1956, a basin account for the Upper Colorado River Basin was authorized, and further consideration is being given to the establishment of a Columbia Basin account.

A westerner had this to say of the basin account policy:

> Obviously, the basin account would discriminate in favor of irrigation development in river basins with great hydroelectric power resources. Specifically, it would make possible in one river basin (such as the Columbia) the development of irrigated lands which were inferior to lands in another river basin where the lesser power resources did not provide a sufficient subsidy. Rather than aiding the expansion of public irrigation development throughout the West, the basin account system might tend to limit it to regions possessing great quantities of hydroelectric power.[76]

In 1951, the House Committee on Interior and Insular Affairs, in reporting out the Collbran project, which had been planned on the basis of applying the interest component of power revenues to show repayment of irrigation costs, took note of the method, and stated [77] that approval of this project was not to be construed as a precedent for application of the interest component in such fashion in the future. Subsequently, upon completing action on the Collbran project in 1952, the Congress called for repayment of the power investment to be made with interest within a 50-year period, and for power revenues after that period to be used to assist in repayment of irrigation costs. That method of repayment, usually referred to as the Collbran formula has been utilized in projects authorized since, notably in the basin account authorized for the Colorado River storage project and participating projects, and Bureau of Reclamation policies no longer include application of the interest component to show repayment of irrigation costs assigned to be repaid from power revenues. On the other hand, repayment periods are thus lengthened, so that the net effect on the Federal Treasury would be much the same unless,

[76] Huffman, Roy E., "Irrigation Development and Public Water Policy," New York, the Ronald Press Co. 1953, p. 174.
[77] H. Rept. 1051, 82d Cong., 1st sess.

as in the case of the Colorado River storage project, there is a requirement that the costs of each unit and separable feature of the project be repaid within 50 years after completion, exclusive of any development period, during which repayments are deferred. This requirement, if followed, might require completion of irrigation units to be deferred until it could be seen that surplus power revenues could be expected to be available to return their costs within the 50-year period.

One of the most recent policies adopted by the Congress for the use of power revenues to assist in repaying irrigation costs is the Chief Joseph Dam formula, under which several irrigation units in the vicinity were authorized to be coupled for repayment purposes with that large project, constructed by the Army Corps of Engineers. In 1956, the formula was extended to the Crooked River project in Oregon, which was added to the Dalles project, over a hundred miles away. Under the formula, the irrigation costs in excess of the repayment ability of the water users will be repaid by net power revenues from the dam after the power allocation is repaid with interest. However, since power and revenues from all of the powerplants on the Federal system on the Columbia River are merged for marketing and repayment purposes, the Chief Joseph Dam formula functions the same as a basin account.

COST INCREASES

The emphasis placed on reimbursability of the reclamation program has resulted in focusing a great deal of attention on increases in estimated costs of projects between the time of authorization and the completion of the projects. Cost increases of this nature were particularly pronounced on the early projects which in many cases were authorized or initiated without adequate investigations having been completed, and on projects authorized before the Second World War, on which construction was disrupted because of the war. This has been documented in great detail by the Hoover Commission Task Force on Water Resources and Power [78] and needs no further discussion here except to say that, like Mr. Blanding's dream house, the reclamation program has been the subject of all the foibles and frailties of planners and engineers, compounded by the inexorable rise in construction costs over the several decades which generally elapse between the time of authorization and completion of most projects.

From time to time, the Bureau of Reclamation has analyzed cost increases on reclamation projects to determine the primary reasons for such increases. The most recent analysis is for the projects in the 1957 construction program and was published by the Bureau in October 1955.[79] This analysis showed that the 57 projects included in the 1957 construction program, estimated to cost $2,793,904,153 at time of authorization, had a current estimated cost of $4,758,225,372, or an increase of about 70 percent. The percentage increase is heavily weighted by the increase on the units in the then current Missouri River Basin project program of 282 percent; the increase on the other 56 projects averaged only 25 percent. Thus, it appears that the Bureau's poor record on this aspect of its program, at least

[78] Commission on Organization of the Executive Branch of the Government, "Task Force Report on Water Resources and Power," June 1955, vol. II, table facing p. 716.

[79] "Analysis of Cost Increases, Authorizations and Benefits of Reclamation Projects," U.S. Department of the Interior, Bureau of Reclamation, October 1955.

on the recent projects, is largely due to experience with the Missouri River Basin project, where it appears that too much was authorized too soon. The Bureau has broken down the percentage cost increases as follows:

Percentage increase over cost estimates at time of authorization

	Active units, Missouri Basin project	Balance of construction projects in 1957 program
1. Changes in general price and cost levels	96.3	15.6
2. Changes in project plan	163.3	1.7
3. Structural and engineering modifications	−3.1	−.3
4. Unforeseen conditions	1.9	2.6
5. Inadequacies of estimate	21.0	5.4
6. National emergencies	.1	.4
7. Other	2.5	−.3
Total	282.0	25.1

FINANCING

The reclamation program was financed entirely from the reclamation fund until the 1914 fiscal year, when the first advances from the general fund were made in the form of loans under the act of June 25, 1910. From 1914 to 1918, $20 million was so advanced, of which $1 million a year was repaid from the reclamation fund to the general fund each year from fiscal year 1921 through 1930. Annual repayments were terminated by the Congress in 1931, and an additional $5 million was authorized to be advanced to the reclamation fund. The amount of $15 million still owned to the general fund was reimbursed by the act of May 9, 1938, which, in effect, made the balance owed on the advances a permanent part of the reclamation fund.

Between 1917 and 1924, about $3 million of general funds were appropriated for the Bureau of Reclamation to take care of Federal employees' compensation increases, claims, and other deficiencies, but it was not until fiscal year 1930 that any substantial amount was appropriated from the general fund to carry on the reclamation program. During the thirties, a total of over $190 million of general funds was allocated to the Bureau of Reclamation from emergency relief appropriations, and from that time on through the middle fifties, the amount of the reclamation program financed by appropriations from the general fund of the Treasury substantially exceeded the amount financed from the reclamation fund. Revenues and repayments from reclamation projects and features built with appropriations from the general fund are credited to the reclamation fund, so that it is growing at a much faster rate than if the reclamation program had been financed entirely from the reclamation fund. The comingling of funds thus brought about has changed the original concept of the reclamation program as a self-financed western development, although if the reclamation fund continues to grow it may soon again be adequate to finance the entire reclamation program. Annual receipts of the reclamation fund reached the $100 million level in the 1957 fiscal year. Full details on accretions to and appropriations from the reclamation fund, and other reclamation appro-

priations through the 1957 fiscal year are contained in the statistical appendix to the report of the Commissioner of Reclamation.[80]

Through June 30, 1957, a total of $3,658,316,950 had been appropriated or allotted by the Secretary for carrying out the reclamation program, of which about 30 percent had come from the reclamation fund. These funds were appropriated for the following purposes:

	Millions	Percent
Construction and rehabilitation	$3,133	85.7
Operation and maintenance	377	10.3
Investigations	73	2.0
Administrative expenses	71	1.9
Emergency fund	3	.1
Total	3,658	100.0

Irrigation operation and maintenance costs are generally paid in advance by the water users, but still must be appropriated by Congress in the annual appropriations. In a few cases, operation and maintenance costs are funded and included in the construction repayment obligation. Power operation and maintenance costs are reimbursed by power revenues, and flood control operation and maintenance costs are nonreimbursable. Investigation costs are added to construction costs and included in the repayment obligation when the project for which they are incurred is constructed. Administrative expenses are nonreimbursable under the law.

Recent appropriations for the reclamation program have ranged from as high as $358 million in 1950 down to $143 million in 1954, and the program now appears to be trending upward from that low point and may soon exceed the previous high point. Expenditures on the total program are shown by fiscal years and, cumulatively, on table XIII. Some of the funds are appropriated in annual accounts, and revert to the Treasury if not expended within the fiscal year. Also, there is generally a time lag between appropriations and expenditures for construction projects. For these reasons, expenditures through June 30, 1957, were only $3,460,036,737, some $200 million less than appropriations. Of this, $2,963,218,462 were carried on the books of the Bureau of Reclamation as project costs.

[80] Report of the Commissioner of the Bureau of Reclamation to the Secretary of the Interior for the fiscal year ended June 30, 1957. Statistical appendix, pp. 15–32.

TABLE XIII.—*Bureau of Reclamation, total expenditures for all purposes, by fiscal years since 1903* [1]

Fiscal year	Amount	Cumulative total	Fiscal year	Amount	Cumulative total
1903	$269,094	$269,094	1931	$13,942,762	$264,721,516
1904	1,513,431	1,782,525	1932	26,345,915	291,067,431
1905	3,767,922	5,550,447	1933	25,204,914	316,272,345
1906	7,107,716	12,658,163	1934	24,751,833	341,024,178
1907	12,533,916	25,192,079	1935	40,882,912	381,907,090
1908	11,799,956	36,992,035	1936	49,849,120	431,756,210
1909	10,390,395	47,382,430	1937	52,379,804	484,136,014
1910	10,050,733	57,433,163	1938	65,405,810	549,541,824
1911	9,556,325	66,989,488	1939	79,329,428	628,871,252
1912	11,663,193	78,652,681	1940	96,365,934	725,237,186
1913	8,791,905	87,444,586	1941	85,596,434	810,833,620
1914	10,437,941	97,882,527	1942	91,438,942	902,272,562
1915	14,213,173	112,095,700	1943	69,287,440	971,560,002
1916	8,805,940	120,901,640	1944	54,587,242	1,026,147,244
1917	8,023,130	128,924,770	1945	50,376,076	1,076,523,320
1918	8,982,355	137,907,125	1946	64,362,888	1,140,886,208
1919	8,645,625	146,552,750	1947	123,142,887	1,264,029,095
1920	6,399,871	152,952,621	1948	178,824,231	1,442,853,326
1921	10,034,149	162,986,770	1949	244,362,878	1,687,216,204
1922	8,760,134	171,746,904	1950	298,373,537	1,985,589,741
1923	10,045,703	181,792,607	1951	298,240,662	2,283,830,403
1924	11,873,766	193,666,373	1952	256,372,495	2,540,202,898
1925	10,869,452	204,535,825	1953	230,922,774	2,771,125,672
1926	8,906,138	213,441,963	1954	196,402,092	2,967,527,764
1927	7,449,552	220,891,515	1955	160,692,813	3,128,220,577
1928	8,636,998	229,528,513	1956	161,025,519	3,289,246,096
1929	10,254,937	239,783,450	1957	170,790,641	3,460,036,737
1930	10,995,304	250,778,754	1958	225,979,790	3,686,016,527

[1] Source: Bureau of the Budget.

With the establishment of the Upper Colorado River Basin fund, the Bureau of Reclamation was authorized to expend revenues for operation, maintenance and replacements without further appropriation by the Congress. The Bureau has similar authority on the Fort Peck power facilities, under the continuing fund for emergency expenses, Fort Peck project, Montana. However, funds for all new construction on both projects must be appropriated by Congress.

The total estimated cost of the entire reclamation program authorized through the 85th Congress, exclusive of distribution system and small project loan programs, is $7,994,748,851,[81] including only the Bureau of Reclamation part of the Missouri River Basin project. Costs of the Corps of Engineers and other agency programs which are part of the Missouri River Basin project are estimated at an additional $2,494,524,390. The latter costs cannot be ignored in looking at the reclamation program, as they include $179 million of the costs of the corps' main stem dams allocated to irrigation, and as the major portion of the project repayment must come from power revenues from the main stem dams which the corps is building. A statistical summary of the entire authorized program, based on figures obtainable from the Bureau of Reclamation publications and other information presented to Congress, is contained in table XIV. While the use of figures from the bookkeeping records of the Bureau of Reclamation which of necessity carry the figures down to the last dollar implies a great deal of precision, this is not intended, as many of the figures are based on tentative allocation of costs.

Of the Bureau of Reclamation program total costs, $558 million or 7 percent will be nonreimbursable and $7,436 million or 93 percent

[81] Costs taken from statistical appendix to report of the Commissioner of the Bureau of Reclamation, 1957, except for projects authorized since June 30, 1957, for which latest cost estimates presented to the Congress were used.

TABL

FEDERAL RECLAMATION PROGRAM -- C

Project and State	Year of first authorization	Irrigable Acreage: New land	Irrigable Acreage: Supplemental water supply	Ultimate installed power capacity	Estimated total costs ultimate	Non-Reimbursable Costs: Irrigation	Non-Reimbursable Costs: Navigation and flood control	Non-Reimbursable Costs: Fish & wild life, recreation & others	Non-Reimbursable Costs: Total non-reimbursable	Reimb: Irrigation	Reimb: Commercial power
TOTAL		8,696,275	4,522,867	7,477,650	7,994,748,851	73,818,691	392,524,903	92,119,530	558,463,124	4,797,978,340	2,253,235,040
Arnold, Oregon	1947	4,292	-----		267,926a/	-----	-----	-----	-----	267,926	-----
Austin, W. C., Oklahoma	1938	47,809	-----		12,246,811	8,276,049	1,130,000	-----	9,406,049	1,760,762	-----
Avondale, Idaho	1953	927	-----		244,424	-----	-----	-----	-----	244,424	-----
Baker, Oregon	1931	-----	7,312		281,589	-----	-----	-----	-----	281,589	-----
Balmorhea, Texas	1944	-----	10,608		406,533	181,698	-----	-----	181,698	224,835	-----
Belle Fourche, S. Dakota	1904	57,182	-----		5,038,107	1,479,300	-----	-----	1,479,300	3,558,807	-----
Bitter Root, Montana	1930	16,665	-----		1,257,124	2,310	-----	-----	2,310	1,254,814	-----
Boise, Idaho--Oregon	1905	90,830	133,384	50,000	66,882,248	82,394	14,827,159	-----	14,909,553	47,018,695	4,954,000
Boulder Canyon, Ariz., Cal., Nev.											
All American Canal	1928	618,587	-----		68,344,647	3,260,650	4,838,760	-----	8,099,410	59,779,594	-----
Hoover Dam & Powerplant	1928	-----	-----	1,354,300	174,205,934	-----	-----	3,250,322	3,250,322	-----	145,955,612
Buffalo Rapids, Mont.	1937	23,325	2,193		5,092,233	3,444,728	-----	-----	3,444,728	1,647,505	-----
Buford-Trenton (old), N. D.	1904	10,510	-----		223,423	221,424	-----	-----	221,424	1,999	-----
Buford-Trenton, N. Dak.	1939	-----	-----		1,320,087	726,267	-----	-----	726,267	593,820	-----
Burnt River, Oregon	1935	-----	15,230		601,026	-----	-----	-----	-----	601,026	-----
Cachuma, California	1948	500	26,450		43,360,456	-----	-----	-----	-----	43,360,456	-----
Canadian River, Texas	1950	-----	-----		95,500,000	-----	-----	-----	-----	-----	-----
Carlsbad, New Mexico	1905	25,055	-----		5,279,091	556,713	1,007,612	-----	1,564,325	3,714,766	-----
Central Valley, California	1935	292,343	982,504	999,350	823,497,385	-----	48,624,000	11,843,000	60,467,000	450,603,917	292,037,000
Chief Joseph Dam, Wash.	1954	3,192	341		3,915,000	-----	-----	17,500	17,500	3,897,500	-----
Collbran, Colorado	1952	2,310	18,340	13,000	14,100,000	-----	-----	133,000	133,000	4,162,000	9,791,000
Colorado-Big Thompson, Colo.	1937	-----	615,000	183,950	158,998,545	-----	-----	-----	-----	100,661,583	56,981,876
Colorado River, Tex.	1937	-----	-----		23,439,644	-----	12,972,602	4,956,542	17,929,144	-----	5,510,500
Colo. R. Ft. Wk. & Levee Sys.	1940	-----	-----		9,692,687	-----	8,964,115	-----	8,964,115	-----	-----
Colo. R. Storage & Part Project	1956	131,280	219,790	1,218,000	992,174,000	-----	2,920,000	2,962,000	5,882,000	272,867,000	658,160,000
Columbia Basin, Wash.	1935	985,687	-----	1,974,000	756,055,000	-----	1,000,000	200,000	1,200,000	562,236,700	192,304,860
Crescent Lake Dam, Oregon	1954	6,831	-----		320,000	-----	-----	-----	-----	320,000	-----
Crooked River, Oregon	1956	9,990	10,220		7,293,000	-----	1,120,500	48,200	1,168,700	6,124,300	-----
Dalton Gardens, Idaho	1953	944	-----		270,200	-----	-----	-----	-----	270,200	-----
Deschutes, Oregon	1937	50,000	49,959		14,136,214	1,617,758	-----	-----	1,617,758	12,518,456	-----
Eden, Wyoming	1940	19,770	-----		8,073,822	-----	-----	-----	-----	8,055,834	-----
Eklutna, Alaska	1950	-----	-----	32,000	32,759,692	-----	-----	-----	-----	-----	32,759,692
Falcon, Texas c/	1954	-----	-----		-----	-----	-----	-----	-----	-----	-----
Fort Peck, Mont.--N. Dak. f/	1938	-----	-----		23,876,607	-----	-----	-----	-----	-----	23,876,607
Fort Sumner, New Mexico	1949	6,500	-----		2,372,408	-----	-----	-----	-----	2,372,408	-----
Frenchtown, Mont.	1935	4,810	-----		279,321	-----	-----	-----	-----	279,321	-----
Fruitgrowers Dam, Colo.	1938	-----	2,662		200,309	-----	-----	-----	-----	200,309	-----
Garden City, Kansas	1905	-----	-----		334,475	334,475	-----	-----	334,475	-----	-----
Gila, Arizona	1937	97,970	-----		51,657,325	6,467,356	-----	-----	6,467,356	45,189,969	-----
Grand Valley, Colo.	1911	34,765	7,730	3,000	7,452,543	2,130,726	-----	-----	2,130,726	5,321,817	-----
Grants Pass, Oregon	1949	10,309	-----		208,000	-----	-----	208,000	208,000	-----	-----
Greater Wenatche Div., Wash.	1958	7,221	1,440		10,670,000	-----	-----	98,600	98,600	10,571,400	-----
Hondo, New Mexico	1903	-----	-----		339,377	339,377	-----	-----	339,377	-----	-----
Humboldt, Nevada	1935	-----	40,500		1,337,321	-----	-----	-----	-----	1,337,321	-----
Hungry Horse, Montana	1944	-----	-----	285,000	101,711,192	-----	19,669,000	-----	19,669,000	-----	82,042,192
Huntley, Montana	1905	32,487	-----		1,845,066	285,614	-----	-----	285,614	1,559,452	-----
Hyrum, Utah	1935	-----	6,800		953,854	-----	-----	-----	-----	953,854	-----
Intake, Montana	1944	881	-----		94,213	47,313	-----	-----	47,313	46,900	-----
Kendrick, Wyoming	1935	22,128	-----	68,400	31,390,761	-----	-----	-----	-----	15,115,827	16,274,934
King Hill, Idaho	1917	-----	-----		1,877,732	1,877,732	-----	-----	1,877,732	-----	-----
Klamath, Calif.--Oreg.	1905	235,292	-----		21,060,014	94,743	-----	-----	94,743	20,965,271	-----
Lewiston Orchards, Idaho	1946	3,589	-----		2,484,397	-----	-----	-----	-----	1,438,681	-----
Little Wood River, Idaho	1956	-----	9,550		2,212,000	-----	263,400	275,000	538,400	1,673,600	-----
Lower Yellowstone, Mont.-N. Dak.	1904	56,271	1,047		3,633,219	391,789	-----	-----	391,789	3,241,430	-----
Mancos, Colorado	1940	-----	8,761		3,914,818	3,029,764	-----	-----	3,029,764	885,054	-----
Mercedes Div., Texas	1958	-----	68,000		10,100,000	-----	-----	-----	-----	10,100,000	-----
Michaud Flats, Idaho	1954	11,250	-----		4,652,700	-----	-----	-----	-----	4,652,700	-----
Middle Rio Grande, N. Mexico	1950	223,360	-----		26,373,000	2,307,000	13,626,000	-----	15,933,000	10,440,000	-----
Milk River, Montana	1903	131,490	-----		9,879,715	2,394,080	-----	-----	2,394,080	7,389,635	-----
Minidoka, Idaho--Wyoming	1904	268,475	860,673	43,400	36,775,921	2,288	-----	33,477	35,765	33,904,571	2,835,585
Mirage Flats, Nebraska	1940	11,657	-----		3,061,626	2,219,708	-----	-----	2,219,708	841,918	-----
Missoula Valley, Montana	1944	977	-----		278,321	233,321	-----	-----	233,321	45,000	-----
Missouri River Basin g/	1944			(2,389,300)	(5,898,391,200)	-----	(1,826,862,800)	(54,691,500)	(1,881,554,300)	(2,734,998,200)	(1,182,763,200)
Bureau of Recl.		3,294,344	419,770	672,300	3,403,866,810	-----	186,634,800	51,319,500	237,954,300	2,555,795,200	549,551,810
Corps of Engineers		-----	-----	(1,632,000)	(2,436,836,000)	-----	(1,640,228,000)	(3,372,000)	(1,643,600,000)	(179,203,000)	(614,033,000)
Other Interior Agencies		-----	-----		(38,510,000)	-----	-----	-----	-----	-----	-----
Fort Peck Project power		-----	-----	(85,000)	(19,178,390)	-----	-----	-----	-----	-----	(19,178,390)
Moon Lake, Utah	1935	-----	75,256		1,799,859	200,500	-----	-----	200,500	1,599,359	-----
Newlands, Nevada	1903	72,370	-----		7,895,022	4,462,070	-----	-----	4,462,070	3,432,952	-----
Newton, Utah	1940	-----	2,200		712,592	362,437	-----	-----	362,437	350,155	-----
North Platte, Nebr.--Wyo.	1903	226,323	131,081	6,200	26,367,311	615,068	-----	-----	615,068	23,532,020	2,220,223
Ochoco, Oregon	1948	8,500	-----		849,830d/	-----	349,830	-----	349,830	500,000	-----
Ogden River, Utah	1935	-----	22,867		5,000,984	278,000	-----	-----	278,000	4,722,984	-----
Okanogan, Washington	1905	5,307	-----		1,602,946	978,504	-----	-----	978,504	624,442	-----
Orland, California	1907	19,444	-----		3,333,870	-----	-----	-----	-----	3,333,870	-----
Owyhee, Oreg.--Idaho	1926	105,169	13,800		19,398,775	-----	-----	-----	-----	19,398,775	-----
Palisades, Idaho--Wyoming	1941	-----	-----	114,000	62,500,000	-----	17,528,000	648,000	18,176,000	27,067,090	17,256,910
Palo Verde, Ariz.--Calif.	1954	-----	-----		5,356,593	-----	3,681,593	-----	3,681,593	1,675,000	-----
Paonia, Colorado g/ h/	1939	11,653	-----		(7,813,000)	-----	(72,000)	(57,000)	(129,000)	(7,684,000)	-----
Parker-Davis, Ariz.--Calif.--Nev.					142,254,735	-----	-----	903,455	903,455	11,817,889	105,998,164
Parker Dam	1935	-----	-----	120,000	(24,201,808)		-----	-----	-----	-----	
Davis Dam	1941	-----	-----	225,000	(118,052,927)		-----	-----	-----		
Pecos River Basin Water Cons. N.M.	1958	-----	-----		2,750,000	2,750,000j/	-----	-----	2,750,000j/	-----	-----
Pine River, Colorado	1937	-----	41,193		3,469,877	-----	1,948,526	-----	1,948,526	1,521,351	-----
Preston Bench, Idaho	1948	-----	4,500		450,100	-----	-----	-----	-----	450,100	-----
Provo River, Utah	1935	-----	46,609	5,000	34,020,266	58,334	-----	-----	58,334	8,528,860	1,025,000
Rapid Valley, S. Dakota	1939	-----	8,900		927,412	-----	-----	-----	-----	427,412	-----
Rathdrum Prairie, Idaho	1944	4,682	-----		1,029,860	173,951	-----	-----	173,951	855,909	-----
Rio Grande, New Mex.--Texas	1905	177,951	18,330	24,300	27,407,815	673,935	1,519,654	1,000,000	3,193,589	14,215,945	9,998,281
Riverton, Wyoming	1920	64,508	8,381	1,600	30,156,592	608,034	-----	-----	608,034	29,076,265	472,293
Rogue River Basin, Oregon	1954	7,900	10,030	16,000	22,900,000	-----	354,000	252,000	606,000	14,033,000	8,261,000
Salt River, Arizona	1903	239,581	95,708		36,077,508	-----	-----	-----	-----	36,077,508	-----
San Angelo, Texas	1958	10,000	-----		32,220,000	-----	10,803,000	3,644,000	14,447,000	11,058,000	-----
San Luis Valley, Colorado	1940	-----	-----		3,870,879	-----	1,548,352	-----	1,548,352	2,322,527	-----
Sanpete, Utah	1935	-----	13,663		433,940	59,400	-----	-----	59,400	374,540	-----
Santa Margarita, Calif.	1954	2,800	4,000		22,636,000	-----	-----	-----	-----	-----	-----
Santa Maria, California	1954	3,000	35,700		15,058,000	-----	3,013,000	-----	3,013,000	12,045,000	-----
Scofield, Utah	1943	-----	15,609		943,837	298,081	393,000	-----	691,081	215,741	-----
Shoshone, Wyo.--Mont.	1904	95,716	-----	10,600	24,334,111	2,006,619	-----	-----	2,006,619	18,123,191	4,204,301
Solano, California	1948	71,880	24,190		52,410,000	-----	1,132,000	-----	1,132,000	48,066,300	113,000
Strawberry Valley, Utah	1905	17,635	26,411		3,485,419	-----	-----	-----	-----	3,485,419	-----
Sun River, Montana	1906	94,024	-----		10,393,069	489,662	-----	-----	489,662	9,903,407	-----
Truckee Storage, Nevada	1935	-----	28,977		1,092,423	81,297	-----	-----	81,297	1,011,126	-----
Tucumcari, New Mexico	1937	42,214	-----		15,474,082	10,231,959	-----	-----	10,231,959	5,242,123	-----
Umatilla, Oregon	1905	18,033	14,765		5,236,948	2,308,811	-----	-----	2,308,811	2,928,137	-----
Uncompahgre, Colorado	1903	89,090	-----		8,965,959	2,896,634	-----	-----	2,896,634	6,069,325	-----
Vale, Oregon	1926	32,000	-----		4,866,824	-----	-----	-----	-----	4,866,824	-----
Ventura River, California	1956	10,700	2,500		27,700,000	-----	-----	100,000	100,000	15,823,080	-----
Vermejo, New Mexico	1950	7,379	-----		2,743,680	461,388	55,000	198,000	714,388	2,029,292	-----
Washita Basin, Oklahoma	1956	14,000	-----		40,300,000	-----	15,417,000	1,388,000	16,805,000	9,698,000	-----
Washoe Basin, Calif.--Nev.	1956	5,100	44,500	28,000	52,000,000	-----	9,791,000	2,113,000	11,904,000	15,554,000	24,542,000
Weber Basin, Utah	1949	51,210	24,400	5,400	70,523,000	-----	7,393,000	5,298,000	12,691,000	41,190,000	-----
Weber River, Utah	1927	-----	109,032		2,724,487	-----	-----	-----	-----	2,724,487	-----
Williston, N. Dakota	1906	-----	-----		409,095	409,095	-----	-----	409,095	-----	-----
Yakima, Washington	1905	266,332	182,001	23,250	61,781,419	4,215	-----	1,229,934	1,234,149	54,896,417	5,650,843
Yuma, Ariz.--Calif.	1904	66,546	-----	1,600	7,480,803	383,738	-----	-----	383,738	6,639,709	457,356
Yuma, Auxiliary, Arizona	1917	3,423	-----		1,143,045	1,022,382	-----	-----	1,022,382	120,663	-----

(Face p. 50)

LE XIV

COSTS -- ALLOCATIONS -- REPAYMENTS a/

Reimbursable Costs				Status of reimbursable nonpower allocations					Actual project costs to June 30, 1957	Repaid to June 30, 1957			
ial r	Municipal & industrial water	Other	Total reimbursable	Under repayment contract June 20, 1957 b/	Repayment contracts pending	Non-irrigation & other obligations to repay c/	Payable from power revenues	Contributions and other sources of repayment		Matured repayment contracts	Power revenues	Other repayments received	Total repayments thru June 30, 1957
,040	174,432,678	210,639,669	7,436,285,727	824,451,095	536,491,100	128,278,729	3,132,536,711	404,393,183	2,963,218,462	129,985,508	189,134,119	36,394,544	355,514,171
-	-----	-----	267,926	197,926	70,000	-----	-----	-----	197,926	32,886	-----	-----	32,886
-	1,089,000	-----	2,840,762	3,262,188	-----	1,518,697	-----	17,271	12,246,811	572,523	-----	17,271	589,794
-	-----	-----	244,424	244,424	-----	-----	-----	-----	244,424	-----	-----	-----	-----
-	-----	-----	281,589	225,015	-----	-----	-----	5,059	225,015	118,276	-----	5,059	123,335
-	-----	-----	224,835	255,600	-----	30,765	-----	-----	406,533	24,201	-----	-----	24,201
-	-----	-----	3,558,807	4,230,060	-----	676,578	-----	5,325	5,038,107	1,550,114	-----	5,325	1,555,439
-	-----	-----	1,254,814	1,277,741	-----	22,927	-----	-----	1,089,426	382,925	-----	-----	382,925
4,000	-----	-----	51,972,695	30,493,577	-----	1,821,473	12,651,688	473,240	64,826,827	12,592,772	2,829,701	764,108	16,186,581
-	465,643	-----	60,245,237	52,444,206	6,567,665	1,566,792	-----	2,583,771	60,738,412	973,605	-----	231,609	1,205,214
5,612	-----	25,000,000	70,955,612	-----	-----	-----	-----	-----	167,720,121	-----	17,132,668	-----	17,132,668
-	-----	-----	1,647,505	1,626,000	-----	-----	-----	21,505	4,924,968	66,300	-----	21,505	87,805
-	-----	-----	1,999	-----	-----	-----	-----	1,999	223,423	-----	-----	1,999	1,999
-	-----	-----	593,820	-----	592,020	-----	-----	1,800	1,090,261	-----	-----	1,800	1,800
-	-----	-----	601,026	599,735	-----	-----	-----	1,291	601,026	269,893	-----	1,291	271,184
-	•	-----	43,360,456	5,800,000	-----	-----	-----	38,800,288	43,147,124	2,557	-----	208,972	211,529
-	-----	95,500,000i/	95,500,000	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-	-----	-----	3,714,766	3,766,761	-----	93,396	-----	41,401	5,239,592	1,853,197	-----	41,401	1,894,598
7,000	17,419,000	2,970,468	763,030,385	62,483,022	-----	-----	105,287,300	279,317,700	531,014,714	140,502	66,864,568	1,779,991	68,785,061
-	-----	-----	3,897,500	1,373,200	571,100	132,900	2,086,100	-----	1,134,881	128	-----	-----	128
1,000	-----	104,000	14,057,000	-----	-----	-----	3,092,000	-----	220,529	-----	-----	-----	-----
1,876	-----	1,355,086	158,998,545	26,032,705	-----	-----	71,499,557	3,129,321	158,231,831	-----	5,092,710	1,499,932	6,592,642
0,500	-----	-----	5,510,500	5,510,500	-----	5,510,500	-----	-----	23,439,644	-----	-----	-----	-----
-	-----	728 572	728,572	-----	-----	-----	-----	-----	9,692,687	-----	-----	-----	-----
0,000	44,419,000	10,846,000i/	986,292,000	-----	30,112,000	-----	230,865,000	11,890,000	8,394,711	-----	-----	-----	-----
4,860	-----	313,440	754,855,000	87,547,721	917,279	-----	473,771,700	-----	504,851,705	68,230	59,601,377	204,385	59,873,992
-	-----	-----	320,000	320,000	-----	-----	-----	-----	320,253	-----	-----	-----	-----
-	-----	-----	6,124,300	-----	1,842,400		2,372,000	1,909,900					
-	-----	-----	270,200	270,200	-----	-----	-----	-----	258,660	-----	-----	-----	-----
-	-----	-----	12,518,456	12,757,160	-----	151,786	447,366	235,731	13,022,832	296,530	-----	235,731	532,261
-	-----	17,988	8,073,822	1,500,000	-----	76,694	6,631,743	785	6,366,665	-----	-----	-----	-----
9,692	-----	-----	32,759,692	-----	-----	-----	-----	-----	32,434,623	-----	768,189	-----	768,189
-	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
6,607	-----	-----	23,876,607	-----	-----	-----	-----	-----	12,179,744	-----	-----	27,382	27,382
-	-----	-----	2,372,408	2,432,167	-----	60,934	-----	175	2,371,986	121,608	-----	175	121,783
-	-----	-----	279,321	297,282	-----	17,961	-----	-----	279,321	68,225	-----	-----	68,225
-	-----	-----	200,309	198,241	-----	432	-----	2,500	200,309	60,843	-----	-----	60,843
-	-----	-----	-----	-----	-----	-----	-----	-----	334,475	-----	-----	-----	-----
-	-----	-----	45,189,969	48,116,167	269,636	2,474,194	-----	1,291,833	45,767,652	23,750	-----	255,082	278,832
-	-----	-----	5,321,817	4,967,482	275,000	185,167	-----	268,537	6,171,652	1,520,142	-----	211,300	1,731,442
-	-----	-----	-----	950,000	-----	950,000	-----	-----	22,533	12,500	-----	-----	12,500
-	-----	-----	10,571,400	-----	5,979,250	-----	4,592,150	-----	-----	-----	-----	-----	-----
-	-----	-----	-----	-----	-----	-----	-----	-----	339,377	-----	-----	-----	-----
-	-----	-----	1,337,321	1,334,245	-----	25,441	-----	28,517	1,284,096	472,386	-----	-----	472,386
2,192	-----	-----	82,042,192	-----	-----	-----	-----	-----	101,645,528	-----	4,521,992	1,511	4,523,503
-	-----	-----	1,559,452	1,939,674	-----	408,016	-----	23,088	1,775,175	1,067,668	-----	16,652	1,084,320
-	-----	-----	953,854	944,046	-----	2,077	-----	11,885	953,854	291,934	-----	11,885	303,819
-	-----	-----	46,900	46,900	-----	-----	-----	-----	94,213	4,706	-----	-----	4,706
4,934	-----	-----	31,390,761	2,800,000	-----	-----	14,501,926	613,901	30,478,822	-----	4,439,118	26,478	4,465,596
-	-----	-----	-----	-----	-----	-----	-----	-----	1,877,732	-----	-----	-----	-----
-	-----	-----	20,965,271	7,799,544	-----	154,738	-----	13,352,946	14,530,044	3,153,513	-----	7,828,140	10,981,653
-	1,045,716	-----	2,484,397	2,500,000	-----	1,045,716	-----	-----	2,484,397	84,929	-----	-----	84,929
-	-----	-----	1,673,600	-----	1,673,600	-----	-----	-----	-----	-----	-----	-----	-----
-	-----	-----	3,241,430	4,087,894	-----	925,912	-----	42,986	3,585,927	2,519,871	-----	42,986	2,562,857
-	-----	-----	885,054	900,000	-----	19,207	-----	4,261	3,914,818	45,000	-----	763	45,763
-	-----	-----	10,100,000	-----	10,100,000	-----	-----	-----	-----	-----	-----	-----	-----
-	-----	-----	4,652,700	2,875,000	-----	471,300	2,424,000	-----	2,017,132	-----	-----	-----	-----
-	-----	-----	10,440,000	15,740,000	-----	5,300,000	-----	-----	20,218,503	-----	-----	-----	-----
-	96,000	-----	7,485,635	7,912,496	-----	710,828	-----	185,400	9,612,175	1,352,696	-----	85,573	1,438,269
5,585	-----	-----	36,740,156	21,795,897	11,532,885	1,056,199	-----	2,426,193	33,075,694	17,048,018	4,508,712	2,957,179	24,513,909
-	-----	-----	841,918	841,918	-----	40,139	-----	-----	3,061,626	42,780	-----	4,733	47,513
-	-----	-----	45,000	45,000	-----	-----	-----	-----	278,320	844	-----	-----	844
3,200)	(19,958,400)	(79,117,100)	(4,016,836,900)										
1,810	19,958,400	40,607,100	3,165,912,510	34,970,824	380,595,376	-----	2,140,229,000	-----	411,230,980	85	-----	-----	85
3,000)	-----	-----	(793,236,000)		-----	-----	(179,203,000)	-----	N.A.	-----	N.A.	N.A.	N.A.
-	-----	(38,510,000)	(38,510,000)			-----	-----	-----	N.A.	-----	-----	-----	-----
8,390)	-----	-----	(19,178,390)			-----	-----	-----		-----	-----	-----	-----
-	-----	-----	1,599,359	1,592,268	-----	1,002	-----	8,093	1,799,859	557,294	-----	8,093	565,387
-	-----	-----	3,432,952	3,757,749	-----	83,625	-----	34,053	7,895,021	2,791,864	-----	1,453	2,793,317
-	-----	-----	350,155	350,000	-----	-----	-----	155	712,592	78,750	-----	-----	78,750
0,223	-----	-----	25,752,243	24,015,786	1,880,410	10,246,746	6,636,873	132,033	24,184,396	16,470,247	4,346,196	132,046	20,948,489
-	-----	-----	500,000	500,000	-----	-----	-----	-----	849,830	-----	-----	-----	-----
-	-----	-----	4,722,984	4,734,935	-----	11,389	-----	12,887	5,000,984	1,344,814	-----	12,667	1,357,481
-	-----	-----	624,442	594,598	-----	28,128	-----	57,972	1,505,570	250,318	-----	58,186	308,504
-	-----	-----	3,333,870	2,999,625	500,000	189,915	-----	24,160	2,643,161	1,610,362	-----	24,160	1,634,522
-	-----	-----	19,398,775	19,826,659	-----	478,643	-----	85,500	19,276,333	2,517,255	-----	85,500	2,602,755
6,910	-----	-----	44,324,000	7,301,675	1,998,325	-----	17,765,325	1,765	58,788,943	-----	224,486	22,353	246,839
-	-----	-----	1,675,000	1,675,000	-----	-----	-----	-----	3,407,385	10,000	-----	-----	10,000
-	-----	-----	(7,684,000)	2,320,000	-----	-----	-----	-----	1,751,955	-----	-----	-----	-----
8,164	13,011,227	10,524,000	141,351,280	-----	-----	-----	11,817,889	-----	140,878,522	-----	12,859,884	13,011,227	25,871,111
-	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-	-----	-----	1,521,351	1,500,000	-----	4,215	-----	25,566	3,469,877	329,180	-----	3,096	333,276
-	-----	-----	450,100	450,300	-----	200	-----	-----	-----	-----	-----	-----	-----
5,000	24,408,072	-----	33,961,932	32,136,887	814,978	25,328,222	-----	90,239	32,967,077	3,419,395	-----	52,182	3,471,487
-	500,000	-----	927,412	1,100,000	-----	500,000	-----	427,412	920,223	125,000	-----	-----	125,000
-	-----	-----	855,909	855,909	-----	-----	-----	-----	582,821	65,906	-----	-----	65,906
8,281	-----	-----	24,214,226	10,144,123	-----	425,629	4,005,906	491,545	27,348,377	7,243,011	225,903	491,545	7,960,459
2,293	-----	-----	29,548,558	9,881,827	10,698,903	427,401	308,008	250,067	22,170,654	665,450	498,769	50,067	1,214,286
1,000	-----	-----	22,294,000	7,522,000	1,176,409	-----	5,334,591	-----	2,600,671	-----	-----	4,521	4,521
-	-----	-----	36,077,508	24,239,992	9,242,696	1,048,093	-----	3,260,816	20,077,508	13,981,110	-----	2,312,097	16,293,207
-	6,715,000	-----	17,773,000	-----	4,000,000	13,773,000	-----	-----	-----	-----	-----	-----	-----
-	-----	-----	2,322,527	2,520,000	-----	8,688	-----	-----	3,870,879	-----	-----	-----	-----
-	-----	-----	374,540	373,376	-----	-----	-----	1,164	433,940	156,520	-----	1,164	157,684
-	-----	22,636,000i/	22,636,000	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-	-----	-----	12,045,000	13,969,000	-----	-----	-----	-----	4,097,011	-----	-----	-----	-----
-	-----	37,015	252,756	247,000	-----	32,366	-----	1,107	943,837	85,000	-----	-----	85,000
4,301	-----	-----	22,327,492	7,207,609	9,608,632	487,366	1,046,458	3,900	21,353,927	2,729,008	3,535,133	241,069	6,505,210
3,000	3,098,700	-----	51,278,000	-----	15,164,000	-----	-----	32,902,300	29,824,174	-----	-----	-----	-----
-	-----	-----	3,485,419	3,349,424	-----	117,285	-----	254,185	3,485,419	2,673,893	-----	4,179	2,678,072
-	-----	-----	9,903,407	10,001,736	-----	247,328	-----	-----	10,077,304	1,762,524	-----	91,109	1,853,633
-	-----	-----	1,011,126	1,000,000	-----	10,832	-----	21,958	1,092,423	350,340	-----	21,603	371,943
-	-----	-----	5,242,123	5,901,897	-----	674,817	-----	15,043	15,474,082	45,856	-----	15,043	60,899
-	-----	-----	2,928,137	1,142,042	-----	315,344	-----	2,101,439	5,218,460	525,298	-----	116,996	642,294
-	-----	-----	6,069,325	6,874,017	-----	830,293	-----	25,601	8,965,959	1,266,838	-----	-----	1,266,838
-	-----	-----	4,866,824	5,022,287	-----	199,281	-----	43,818	4,866,824	546,641	-----	44,723	591,364
-	11,776,920	-----	27,600,000	27,500,000	-----	11,776,920	-----	676,983	6,260,251	-----	-----	676,983	676,983
-	-----	-----	2,029,292	2,107,943	-----	78,651	-----	-----	2,494,996	-----	-----	-----	-----
-	13,797,000	-----	23,495,000	-----	23,795,000	14,097,000	-----	-----	713,845	-----	-----	-----	-----
2,000	-----	-----	40,096,000	-----	6,480,000	-----	6,074,000	3,000,000	-----	-----	-----	-----	-----
-	16,642,000	-----	57,832,000	57,694,000	-----	16,642,000	-----	224,900	26,587,964	1,892,136	-----	224,900	2,117,036
-	-----	-----	2,724,487	2,685,872	-----	7,296	-----	45,911	2,724,487	-----	-----	44,757	44,757
-	-----	-----	-----	-----	-----	-----	-----	-----	409,095	-----	-----	-----	-----
0,844	-----	-----	60,547,261	47,216,896	-----	1,399,721	8,891,754	674,636	59,901,562	13,903,720			
7,356	-----	-----	7,097,065	5,365,877	-----	1,050,256	204,377	2,131,629					
-	-----	-----	120,663										

Boulder Canyon, Ariz., Cal., Nev.													
All American Canal	1928	618,587	-----		68,344,647	3,260,650	4,838,760	-----	8,099,410	59,779,594	-----		46
Hoover Dam & Powerplant	1928	-----	-----	1,354,300	174,205,934	-----	-----	3,250,322	3,250,322	-----	145,955,612		----
Buffalo Rapids, Mont.	1937	23,325	2,193		5,092,233	3,444,728	-----	-----	3,444,728	1,647,505	-----		----
Buford-Trenton (old), N. D.	1904	10,510	-----		223,423	221,424	-----	-----	221,424	1,999	-----		----
Buford-Trenton, N. Dak.	1939	-----	-----		1,320,087	726,267	-----	-----	726,267	593,820	-----		----
Burnt River, Oregon	1935	-----	15,230		601,026	-----	-----	-----	-----	601,026	-----		----
Cachuma, California	1948	500	26,450		43,360,456	-----	-----	-----	-----	43,360,456	-----		•
Canadian River, Texas	1950	-----	-----		95,500,000	-----	-----	-----	-----	-----	-----		----
Carlsbad, New Mexico	1905	25,055	-----		5,279,091	556,713	1,007,612	-----	1,564,325	3,714,766	-----		----
Central Valley, California	1935	292,343	982,504	999,350	823,497,385	-----	48,624,000	11,843,000	60,467,000	450,603,917	292,037,000		7,419
Chief Joseph Dam, Wash.	1954	3,192	341		3,915,000	-----	-----	17,500	17,500	3,897,500	-----		----
Colibran, Colorado	1952	2,310	18,340	13,000	14,190,000	-----	-----	133,000	133,000	4,162,000	9,791,000		----
Colorado-Big Thompson, Colo.	1937	-----	615,000	183,950	158,998,545	-----	-----	-----	-----	100,661,583	56,981,876		----
Colorado River, Tex.	1937	-----	-----		23,439,644	-----	12,972,602	4,956,542	17,929,144	-----	5,510,500		----
Colo. R. Ft. Mk. & Levee Sys.	1940	-----	-----		9,692,687	-----	8,964,115	-----	8,964,115	-----	-----		----
Colo. R. Storage & Part Project	1956	131,280	219,790	1,218,000	992,174,000	-----	2,920,000	2,962,000	5,882,000	272,867,000	658,160,000		44,419
Columbia Basin, Wash.	1935	985,687	-----	1,974,000	756,055,000	-----	1,000,000	200,000	1,200,000	562,236,700	192,304,860		----
Crescent Lake Dam, Oregon	1954	6,831	-----		320,000	-----	-----	-----	-----	320,000	-----		----
Crooked River, Oregon	1956	9,990	10,220		7,293,000	-----	1,120,500	48,200	1,168,700	6,124,300	-----		----
Dalton Gardens, Idaho	1953	944	-----		270,200	-----	-----	-----	-----	270,200	-----		----
Deschutes, Oregon	1937	50,000	49,959		14,136,214	1,617,758	-----	-----	1,617,758	12,518,456	-----		----
Eden, Wyoming	1940	19,770	-----		8,073,822	-----	-----	-----	-----	8,055,834	-----		----
Eklutna, Alaska	1950	-----	-----	32,000	32,759,692	-----	-----	-----	-----	-----	32,759,692		----
Falcon, Texas e/	1954	-----	-----		-----	-----	-----	-----	-----	-----	-----		----
Fort Peck, Mont.--N. Dak. f/	1938	-----	-----		23,876,607	-----	-----	-----	-----	-----	23,876,607		----
Fort Sumner, New Mexico	1949	6,500	-----		2,372,408	-----	-----	-----	-----	2,372,408	-----		----
Frenchtown, Mont.	1935	4,810	-----		279,321	-----	-----	-----	-----	279,321	-----		----
Fruitgrowers Dam, Colo.	1938	-----	2,662		200,309	-----	-----	-----	-----	200,309	-----		----
Garden City, Kansas	1905	-----	-----		334,475	334,475	-----	-----	334,475	-----	-----		----
Gila, Arizona	1937	97,970	-----		51,657,325	6,467,356	-----	-----	6,467,356	45,189,969	-----		----
Grand Valley, Colo.	1911	34,765	7,730	3,000	7,452,543	2,130,726	-----	-----	2,130,726	5,321,817	-----		----
Grants Pass, Oregon	1949	10,309	-----		208,000	-----	-----	208,000	208,000	-----	-----		----
Greater Wenatche Div., Wash.	1958	7,221	1,440		10,670,000	-----	-----	98,600	98,600	10,571,400	-----		----
Hondo, New Mexico	1903	-----	-----		339,377	339,377	-----	-----	339,377	-----	-----		----
Humboldt, Nevada	1935	-----	40,500		1,337,321	-----	-----	-----	-----	1,337,321	-----		----
Hungry Horse, Montana	1944	-----	-----	285,000	101,711,192	-----	19,669,000	-----	19,669,000	-----	82,042,192		----
Huntley, Montana	1905	32,487	-----		1,845,066	285,614	-----	-----	285,614	1,559,452	-----		----
Hyrum, Utah	1935	-----	6,800		953,854	-----	-----	-----	-----	953,854	-----		----
Intake, Montana	1944	881	-----		94,213	47,313	-----	-----	47,313	46,900	-----		----
Kendrick, Wyoming	1935	22,128	-----	68,400	31,390,761	-----	-----	-----	-----	15,115,827	16,274,934		----
King Hill, Idaho	1917	-----	-----		1,877,732	1,877,732	-----	-----	1,877,732	-----	-----		----
Klamath, Calif.--Oreg.	1905	235,292	-----		21,060,014	94,743	-----	-----	94,743	20,965,271	-----		----
Lewiston Orchards, Idaho	1946	3,589	-----		2,484,397	-----	-----	-----	-----	1,438,681	-----		1,045
Little Wood River, Idaho	1956	-----	9,550		2,212,000	-----	263,400	275,000	538,400	1,673,600	-----		----
Lower Yellowstone, Mont.-N. Dak.	1904	56,271	1,047		3,633,219	391,789	-----	-----	391,789	3,241,430	-----		----
Muncos, Colorado	1940	-----	8,761		3,914,818	3,029,764	-----	-----	3,029,764	885,054	-----		----
Mercedes Div., Texas	1958	-----	68,000		10,100,000	-----	-----	-----	-----	10,100,000	-----		----
Michaud Flats, Idaho	1954	11,250	-----		4,652,700	-----	-----	-----	-----	4,652,700	-----		----
Middle Rio Grande, N. Mexico	1950	223,360	-----		26,373,000	2,307,000	13,626,000	-----	15,933,000	10,440,000	-----		----
Milk River, Montana	1903	131,490	-----		9,879,715	2,394,080	-----	-----	2,394,080	7,389,635	-----		96,
Minidoka, Idaho--Wyoming	1904	268,475	860,673	43,400	36,775,921	2,288	-----	33,477	35,765	33,904,571	2,835,585		----
Mirage Flats, Nebraska	1940	11,657	-----		3,061,626	2,219,708	-----	-----	2,219,708	841,918	-----		----
Missoula Valley, Montana	1944	977	-----		278,321	233,321	-----	-----	233,321	45,000	-----		----
Missouri River Basin g/	1944			(2,389,300)	(5,898,391,200)	-----	(1,826,862,800)	(54,691,500	(1,881,554,300)	(2,734,998,200)	(1,182,763,200)		(19,958,
Bureau of Recl.		3,294,344	419,770	672,300	3,403,866,810	-----	186,634,800	51,319,500	237,954,300	2,555,795,200	549,551,810		19,958,
Corps of Engineers		-----	-----	(1,632,000	(2,436,836,000)	-----	(1,640,228,000)	(3,372,000)	(1,643,600,000)	(179,203,000)	(614,033,000)		-----
Other Interior Agencies		-----	-----		(38,510,000)	-----	-----	-----	-----	-----	-----		-----
Fort Peck Project power		-----	-----	(85,000)	(19,178,390)	-----	-----	-----	-----	-----	(19,178,390)		-----
Moon Lake, Utah	1935	-----	75,256		1,799,859	200,500	-----	-----	200,500	1,599,359	-----		-----
Newlands, Nevada	1903	72,370	-----		7,895,022	4,462,070	-----	-----	4,462,070	3,432,952	-----		-----
Newton, Utah	1940	-----	2,200		712,592	362,437	-----	-----	362,437	350,155	-----		-----
North Platte, Nebr.--Wyo.	1903	226,323	131,081	6,200	26,367,311	615,068	-----	-----	615,068	23,532,020	2,220,223		-----
Ochoco, Oregon	1948	8,500	-----		849,830 d/	-----	349,830	-----	349,830	500,000	-----		-----
Ogden River, Utah	1935	-----	22,867		5,000,984	278,000	-----	-----	278,000	4,722,984	-----		-----
Okanogan, Washington	1905	5,307	------		1,602,946	978,504	-----	-----	978,504	624,442	-----		-----
Orland, California	1907	19,444	-----		3,333,870	-----	-----	-----	-----	3,333,870	-----		-----
Owyhee, Oreg.--Idaho	1926	105,169	13,800		19,398,775	-----	-----	-----	-----	19,398,775	-----		-----
Palisades, Idaho--Wyoming	1941	-----	-----	114,000	62,500,000	-----	17,528,000	648,000	18,176,000	27,067,090	17,256,910		-----
Palo Verde, Ariz.--Calif.	1954	-----	-----		5,356,593	-----	3,681,593	-----	3,681,593	1,675,000	-----		-----
Paonia, Colorado g/ h/	1939	11,653	-----	(7,813,000)	-----	(72,000)	(57,000)	(129,000)	(7,684,000)	-----	-----		-----
Parker-Davis, Ariz.--Calif.--Nev.					142,254,735	-----	-----	903,455	903,455	11,817,889	105,998,164		13,011,
Parker Dam	1935	-----	-----	120,000	(24,201,808)		-----	-----	-----	-----			
Davis Dam	1941	-----	-----	225,000	(118,052,927)		-----	-----	-----				
Pecos River Basin Water Cons. N.M.	1958	-----	-----		2,750,000	2,750,000 i/	-----	-----	2,750,000 i/	-----	-----		-----
Pine River, Colorado	1937	-----	41,193		3,469,877	-----	1,948,526	-----	1,948,526	1,521,351	-----		-----
Preston Bench, Idaho	1948	-----	4,500		450,100	-----	-----	-----	-----	450,100	-----		-----
Provo River, Utah	1935	-----	46,609	5,000	34,020,266	58,334	-----	-----	58,334	8,528,860	1,025,000		24,40
Rapid Valley, S. Dakota	1939	-----	8,900		927,412	-----	-----	-----	-----	427,412	-----		50
Rathdrum Prairie, Idaho	1944	4,682	-----		1,029,860	173,951	-----	-----	173,951	855,909	-----		-----
Rio Grande, New Mex.--Texas	1905	177,951	18,330	24,300	27,407,815	673,935	1,519,654	1,000,000	3,193,589	14,215,945	9,998,281		-----
Riverton, Wyoming	1920	64,508	8,381	1,600	30,156,592	608,034	-----	-----	608,034	29,076,265	472,293		-----
Rogue River Basin, Oregon	1954	7,900	10,030	16,000	22,900,000	-----	354,000	252,000	606,000	14,033,000	8,261,000		-----
Salt River, Arizona	1903	239,581	95,708		36,077,508	-----	-----	-----	-----	36,077,508	-----		-----
San Angelo, Texas	1958	10,000	-----		32,220,000	-----	10,803,000	3,644,000	14,447,000	11,058,000	-----		6,715
San Luis Valley, Colorado	1940	-----	-----		3,870,879	-----	1,548,352	-----	1,548,352	2,322,527	-----		-----
Sanpete, Utah	1935	-----	13,663		433,940	59,400	-----	-----	59,400	374,540	-----		-----
Santa Margarita, Calif.	1954	2,800	4,000		22,636,000	-----	-----	-----	-----	-----	-----		-----
Santa Maria, California	1954	3,000	35,700		15,058,000	-----	3,013,000	-----	3,013,000	12,045,000	-----		-----
Scofield, Utah	1943	-----	15,609		943,837	298,081	393,000	-----	691,081	215,741	-----		-----
Shoshone, Wyo.--Mont.	1904	95,716	-----	10,600	24,334,111	2,006,619	-----	-----	2,006,619	18,123,191	4,204,301		-----
Solano, California	1948	71,880	24,190		52,410,000	-----	1,132,000	-----	1,132,000	48,066,300	113,000		3,098
Strawberry Valley, Utah	1905	17,635	26,411		3,485,419	-----	-----	-----	-----	3,485,419	-----		-----
Sun River, Montana	1906	94,024	-----		10,393,069	489,662	-----	-----	489,662	9,903,407	-----		-----
Truckee Storage, Nevada	1935	-----	28,977		1,092,423	81,297	-----	-----	81,297	1,011,126	-----		-----
Tucumcari, New Mexico	1937	42,214	-----		15,474,082	10,231,959	-----	-----	10,231,959	5,242,123	-----		-----
Umatilla, Oregon	1905	18,033	14,765		5,236,948	2,308,811	-----	-----	2,308,811	2,928,137	-----		-----
Uncompahgre, Colorado	1903	89,090	-----		8,965,959	2,896,634	-----	-----	2,896,634	6,069,325	-----		-----
Vale, Oregon	1926	32,000	-----		4,866,824	-----	-----	-----	-----	4,866,824	-----		-----
Ventura River, California	1956	10,700	2,500		27,700,000	-----	-----	100,000	100,000	15,823,080	-----		11,77
Vermejo, New Mexico	1950	7,379	-----		2,743,680	461,388	55,000	198,000	714,388	2,029,292	-----		----
Washita Basin, Oklahoma	1956	14,000	-----		40,300,000	-----	15,417,000	1,388,000	16,805,000	9,698,000	-----		13,79
Washoe Basin, Calif.--Nev.	1956	5,100	44,500	28,000	52,000,000	-----	9,791,000	2,113,000	11,904,000	15,554,000	24,542,000		-----
Weber Basin, Utah	1949	51,210	24,400	5,400	70,523,000	-----	7,393,000	5,298,000	12,691,000	41,190,000	-----		16,64
Weber River, Utah	1927	-----	109,032		2,724,487	-----	-----	-----	-----	2,724,487	-----		-----
Williston, N. Dakota	1906	-----	-----		409,095	409,095	-----	-----	409,095	-----	-----		----
Yakima, Washington	1905	266,332	182,001	23,250	61,781,410	4,215	-----	1,229,934	1,234,149	54,896,417	5,650,844		----
Yuma, Ariz.--Calif.	1904	66,546	-----	1,600	7,480,803	383,738	-----	-----	383,738	6,639,709	457,356		----
Yuma, Auxiliary, Arizona	1917	3,423	-----		1,143,045	1,022,382	-----	-----	1,022,382	120,663	-----		----

a/ Compiled from Statistical Appendix, Report of the Commissioner of Reclamation, 1957, with the addition of information furnished Congress on recently authorized projects.
b/ Pending adjustments totaling $7,553,980 excluded.
c/ Includes funded charges of $18,093,224 not included in total program costs.
d/ Includes costs charged to deferred maintenance.
e/ Constructed by the International Boundary and Water Commission.
f/ Transmission system.
g/ Brackets indicate th
h/ Paonia costs include
i/ Costs not allocated.
j/ Subject to re-examin
k/ Includes portions of

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				-----	1,821,473	12,651,688	473,240	64,826,827	12,592,772	2,829,781	-----	382,925
											764,108	16,186,581
465,643	-----	60,245,237	52,444,206	6,567,665	1,566,792	-----	2,583,771	60,738,412	973,685	-----	231,609	1,205,214
-----	25,000,000	70,955,612	-----	-----	-----	-----	-----	167,720,121	-----	17,132,668	-----	17,132,668
-----	-----	1,647,505	1,626,000	-----	-----	-----	21,505	4,924,968	66,300	-----	21,505	87,805
-----	-----	1,999	-----	-----	-----	-----	1,999	223,423	-----	-----	1,999	1,999
-----	-----	593,820	-----	592,020	-----	-----	1,800	1,090,261	-----	-----	1,800	1,800
-----	-----	601,026	599,735	-----	-----	-----	1,291	601,026	269,893	-----	1,291	271,184
•	-----	43,360,456	5,800,000	-----	-----	-----	38,800,288	43,147,124	2,557	-----	208,972	211,829
-----	95,500,000i/	95,500,000	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	3,714,766	3,766,761	-----	93,396	-----	41,401	5,239,592	1,853,197	-----	41,401	1,894,598
,419,000	2,970,468	763,030,385	62,483,022	-----	-----	105,287,300	279,317,700	531,014,714	140,502	66,864,568	1,779,991	68,785,061
-----	-----	3,897,500	1,373,200	571,100	132,900	2,086,100	-----	1,134,881	128	-----	-----	126
-----	104,000	14,057,000	-----	-----	-----	3,092,000	-----	220,529	-----	-----	-----	-----
-----	1,355,086	158,998,545	26,032,705	-----	-----	71,499,557	3,129,321	158,231,831	-----	5,092,710	1,499,932	6,592,642
-----	-----	5,510,500	5,510,500	-----	5,510,500	-----	-----	23,439,644	-----	-----	-----	-----
-----	728,572	728,572	-----	-----	-----	-----	-----	9,692,687	-----	-----	-----	-----
,419,000	10,846,000i/	986,292,000	-----	30,112,000	-----	230,865,000	11,890,000	8,394,711	-----	-----	-----	-----
-----	313,440	754,855,000	87,547,721	917,279	-----	473,771,700	-----	504,851,705	68,230	59,601,377	204,385	59,873,992
-----	-----	320,000	320,000	-----	-----	-----	-----	320,253	-----	-----	-----	-----
-----	-----	6,124,300	-----	1,842,400		2,372,000	1,909,900					
-----	-----	270,200	270,200	-----	-----	-----	-----	258,660	-----	-----	-----	-----
-----	-----	12,518,456	12,757,160	-----	151,786	447,366	235,731	13,022,832	296,530	-----	235,731	532,261
-----	17,988	8,073,822	1,500,000	-----	76,694	6,631,743	785	6,366,665	-----	-----	-----	-----
-----	-----	32,759,692	-----	-----	-----	-----	-----	32,434,623	-----	768,189	-----	768,189
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	23,876,607	-----	-----	-----	-----	-----	12,179,744	-----	-----	27,382	27,382
-----	-----	2,372,408	2,432,167	-----	60,934	-----	175	2,371,986	121,608	-----	175	121,783
-----	-----	279,321	297,282	-----	17,961	-----	-----	279,321	68,225	-----	-----	68,225
-----	-----	200,309	198,241	-----	432	-----	2,500	200,309	60,843	-----	-----	60,843
-----	-----	-----	-----	-----	-----	-----	-----	334,475	-----	-----	-----	-----
-----	-----	45,189,969	48,116,167	269,636	2,474,194	-----	1,291,833	45,767,652	23,750	-----	255,082	278,832
-----	-----	5,321,817	4,967,482	275,000	185,167	-----	268,537	6,171,652	1,520,142	-----	211,300	1,731,442
-----	-----	-----	950,000	-----	950,000	-----	-----	22,533	12,500	-----	-----	12,500
-----	-----	10,571,400	-----	5,979,250	-----	4,592,150	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	339,377	-----	-----	-----	-----
-----	-----	1,337,321	1,334,245	-----	25,441	-----	28,517	1,284,096	472,386	-----	-----	472,386
-----	-----	82,042,192	-----	-----	-----	-----	-----	101,645,528	-----	4,521,992	1,511	4,523,503
-----	-----	1,559,452	1,939,674	-----	408,016	-----	23,088	1,775,175	1,067,668	-----	16,652	1,084,320
-----	-----	953,854	944,046	-----	2,077	-----	11,885	953,854	291,934	-----	11,885	303,819
-----	-----	46,900	46,900	-----	-----	-----	-----	94,213	4,706	-----	-----	4,706
-----	-----	31,390,761	2,800,000	-----	-----	14,501,926	613,901	30,478,822	-----	4,439,118	26,478	4,465,596
-----	-----	-----	-----	-----	-----	-----	-----	1,877,732	-----	-----	-----	-----
-----	-----	20,965,271	7,799,544	-----	154,738	-----	13,352,946	14,530,044	3,153,513	-----	7,828,140	10,981,653
,045,716	-----	2,484,397	2,500,000	-----	1,045,716	-----	-----	2,484,397	84,929	-----	-----	84,929
-----	-----	1,673,600	-----	1,673,600	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	3,241,430	4,087,894	-----	925,912	-----	42,986	3,585,927	2,519,871	-----	42,986	2,562,857
-----	-----	885,054	900,000	-----	19,207	-----	4,261	3,914,818	45,000	-----	763	45,763
-----	-----	10,100,000	-----	10,100,000	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	4,652,700	2,875,000	-----	471,300	2,424,000	-----	2,017,132	-----	-----	-----	-----
-----	-----	10,440,000	15,740,000	-----	5,300,000	-----	-----	20,218,503	-----	-----	-----	-----
96,000	-----	7,485,635	7,912,496	-----	710,828	-----	185,400	9,612,175	1,352,696	-----	85,573	1,438,269
-----	-----	36,740,156	21,795,897	11,532,885	1,056,199	-----	2,426,193	33,075,694	17,048,018	4,508,712	2,957,179	24,513,909
-----	-----	841,918	841,918	-----	40,139	-----	-----	3,061,626	42,780	-----	4,733	47,513
-----	-----	45,000	45,000	-----	-----	-----	-----	278,320	844	-----	-----	844
,958,400)	(79,117,100)	(4,016,836,900)										
,958,400	40,607,100	3,165,912,510	34,970,824	380,595,376	-----	2,140,229,000	-----	411,230,980	85	-----	-----	85
-----	-----	(793,236,000)		-----	-----	(179,203,000)	-----	N.A.	-----	N.A.	N.A.	N.A.
-----	(38,510,000)	(38,510,000)			-----	-----	-----	N.A.	-----	-----	-----	-----
-----	-----	(19,178,390)			-----	-----	-----		-----	-----	-----	-----
-----	-----	1,599,359	1,592,268	-----	1,002	-----	8,093	1,799,859	557,294	-----	8,093	565,387
-----	-----	3,432,952	3,257,749	-----	83,625	-----	34,053	7,895,021	2,791,864	-----	1,453	2,793,317
-----	-----	350,155	350,000	-----	-----	-----	155	712,592	78,750	-----	-----	78,750
-----	-----	25,752,243	24,015,786	1,880,410	10,246,746	6,636,873	132,033	24,184,396	16,470,247	4,346,196	132,046	20,948,489
-----	-----	500,000	500,000	-----	-----	-----	-----	849,830	-----	-----	-----	-----
-----	-----	4,722,984	4,734,935	-----	11,389	-----	12,887	5,000,984	1,344,814	-----	12,667	1,357,481
-----	-----	624,442	594,598	-----	28,128	-----	57,972	1,505,570	250,318	-----	58,186	308,504
-----	-----	3,333,870	2,999,625	500,000	189,915	-----	24,160	2,643,161	1,610,362	-----	24,160	1,634,522
-----	-----	19,398,775	19,826,659	-----	478,643	-----	85,500	19,276,333	2,517,255	-----	85,500	2,602,755
-----	-----	44,324,000	7,301,675	1,998,325	-----	17,765,325	1,765	58,788,943	-----	224,486	22,353	246,839
-----	-----	1,675,000	1,675,000	-----	-----	-----	-----	3,407,385	10,000	-----	-----	10,000
-----	-----	(7,684,000)	2,320,000	-----	-----	-----	-----	1,751,955	-----	-----	-----	-----
3,011,227	10,524,000	141,351,280	-----	-----	-----	11,817,889	-----	140,878,522	-----	12,859,884	13,011,227	25,871,111
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	1,521,351	1,500,000	-----	4,215	-----	25,566	3,469,877	329,180	-----	3,096	332,276
-----	-----	450,100	450,300	-----	200	-----	-----	-----	-----	-----	-----	-----
24,408,072	-----	33,961,932	32,136,887	814,978	25,328,222	-----	90,239	32,967,077	3,419,305	-----	52,182	3,471,487
500,000	-----	927,412	1,100,000	-----	500,000	-----	427,412	920,223	125,000	-----	-----	125,000
-----	-----	855,909	855,909	-----	-----	-----	-----	582,821	65,906	-----	-----	65,906
-----	-----	24,214,226	10,144,123	-----	425,629	4,005,906	491,545	27,348,377	7,243,011	225,903	491,545	7,960,459
-----	-----	29,548,558	9,881,827	10,698,903	427,401	308,008	250,067	22,170,654	665,450	498,769	50,067	1,214,286
-----	-----	22,294,000	7,522,000	1,176,409	-----	5,334,591	-----	2,600,671	-----	-----	4,521	4,521
-----	-----	36,077,508	24,239,992	9,242,696	1,048,093	-----	3,260,816	20,077,508	13,981,110	-----	2,312,097	16,293,207
6,715,000	-----	17,773,000	-----	4,000,000	13,773,000	-----	-----	-----	-----	-----	-----	-----
-----	-----	2,322,527	2,520,000	-----	8,688	-----	-----	3,870,879	-----	-----	-----	-----
-----	-----	374,540	373,376	-----	-----	-----	1,164	433,940	156,520	-----	1,164	157,684
-----	22,636,000i/	22,636,000	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	12,045,000	13,969,000	-----	-----	-----	------	4,097,011	-----	-----	-----	-----
-----	37,015	252,756	247,000	-----	32,366	-----	1,107	943,837	85,000	-----	-----	85,009
-----	-----	22,327,492	7,207,609	9,608,632	487,366	1,046,458	3,900	21,353,927	2,729,008	3,535,133	241,069	6,505,210
3,098,700	-----	51,278,000	-----	15,164,000	-----	-----	32,902,300	29,824,174	-----	-----	-----	-----
-----	-----	3,485,419	3,349,424	-----	117,285	-----	254,185	3,485,419	2,673,893	-----	4,179	2,678,072
-----	-----	9,903,407	10,001,736	-----	247,328	-----	-----	10,077,304	1,762,524	-----	91,109	1,853,633
-----	-----	1,011,126	1,000,000	-----	10,832	-----	21,958	1,092,423	350,340	-----	21,603	371,943
-----	-----	5,242,123	5,901,897	-----	674,817	-----	15,043	15,474,082	45,856	-----	15,043	60,899
-----	-----	2,928,137	1,142,042	-----	315,344	-----	2,101,439	5,218,460	525,298	-----	116,996	642,294
-----	-----	6,069,325	6,874,017	-----	830,293	-----	25,601	8,965,959	1,266,838	-----	-----	1,266,838
-----	-----	4,866,824	5,022,287	-----	199,281	-----	43,818	4,866,824	546,641	-----	44,723	591,364
11,776,920	-----	27,600,000	27,500,000	-----	11,776,920	-----	676,983	6,260,251	-----	-----	676,983	676,983
-----	-----	2,029,292	2,107,943	-----	78,651	-----	-----	2,494,996	-----	-----	-----	-----
13,797,000	-----	23,495,000	-----	23,795,000	14,097,000	-----	-----	713,845	-----	-----	-----	-----
-----	-----	40,096,000	-----	6,480,000	-----	6,074,000	3,000,000	-----	-----	-----	-----	-----
16,642,000	-----	57,832,000	57,694,000	-----	16,642,000	-----	224,900	26,587,964	1,892,136	-----	224,900	2,117,036
-----	-----	2,724,487	2,685,872	-----	7,296	-----	45,911	2,724,487	-----	-----	44,757	44,757
-----	-----	-----	-----	-----	-----	-----	-----	409,095	-----	-----	-----	-----
-----	-----	60,547,261	47,216,896	-----	1,599,721	8,891,754	674,636	59,901,662	13,903,720	823,885	1,030,169	15,757,774
-----	-----	7,097,065	5,365,877	-----	1,050,256	204,377	2,131,629	7,317,531	5,184,036	860,828	481,248	6,526,112
-----	-----	120,663	1,560,268k/	33,536	2,106,308k/	-----	677,737	1,142,817	567,695	-----	641,190	1,208,885

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s of costs of other projects.

will be reimbursable, according to the Bureau of Reclamation. Nonreimbursable costs include $74 million in irrigation costs written off, $393 million allocated to navigation and flood control, and $92 million to the preservation and propagation of fish and wildlife, recreation, and other miscellaneous purposes. Over 60 percent of the nonreimbursable costs are on the Missouri River Basin project. Of the reimbursable costs, it is estimated that the largest part, $4,798 million will be allocated to irrigation; next, $2,253 million will be allocated to commercial power, $174 million to municipal and industrial water supply, and $211 million is not allocated or allocated to other miscellaneous purposes that, it is expected, will have to be repaid.

Of the reimbursable allocations, $824 million was under irrigation repayment contract on June 30, 1957, and repayment contracts were pending on $536 million more. Quite a number of the latter have been entered into since that time. The largest source of irrigation repayments—power revenues—was expected to yield $3,133 million after the power costs have been paid off. Other repayment obligations, including repayment from nonirrigation water use contracts totaled $128 million and other sources of repayment expected, including future water service contracts, water and lease revenues, and contributions, were $404 million. The $2,253 million allocated to commercial power will be repaid with interest, including interest during construction on all new projects, as well as on Eklutna, Colorado-Big Thompson, Central Valley, and Missouri River Basin projects. The full $174 million allocated to municipal and industrial water supply will also be repaid in full, with interest, except in those cases where repayment had already been contracted for before the decision was made in 1948 to charge interest on these costs. The balance of reimbursements, the source of which is not indicated in table XIV, about $157 million, includes irrigation, municipal and industrial water supply, and conservancy district repayment contracts, and possibly a small amount of nonreimbursable costs on projects in deferred status, as well as miscellaneous adjustments. A brief summary of the costs, allocations, and repayments appears in table XV. From this, it will be seen that $5,386 million or 72 percent of the total reimbursable costs are expected to come from power revenues. About half of this, $2,690 million, is in connection with the Missouri River Basin project, which accounts for $2,140 million, or over two-thirds of the $3,133 million total of irrigation costs payable from power revenues. This will require the revenues from the Corps of Engineers power installations as well as from those of the Bureau of Reclamation for many years after the power costs are repaid presently estimated as occurring in the year 2019. If the net power revenues of the Missouri River project hold at about $30 million a year, it would require about 70 years after the power costs are paid out for the irrigation costs to be fully returned by power revenues. In addition, there are $179 million in Corps of Engineers irrigation allocations on the main stem dams to be repaid.

TABLE XV.—*Summary data on costs, allocations, repayments, Federal reclamation program*

[In millions of dollars]

COSTS AND ALLOCATIONS	
Nonreimbursable:	
Irrigation	$74
Flood control and navigation	393
Fish and wildlife, recreation, other	92
Subtotal	558
Reimbursable with interest:	
Commercial power	2,253
Municipal and industrial water supply	[1] 174
Subtotal	2,247
Reimbursable without interest:	
Irrigation	4,798
Other	[2] 211
Subtotal	5,009
Total cost, Bureau of Reclamation portion of program	7,995
REPAYMENT OF REIMBURSABLE COSTS	
Under irrigation repayment contract	[3] 824
Repayment contracts pending	537
Nonirrigation contracts and other obligations to repay	[4] 128
Contributions and other sources of repayment, including extensions of water service contracts	404
Subtotal, water revenues	1,893
Irrigation costs payable by power revenues	3,133
Total accounted for	[5] 5,026
Not accounted for	[6] 157
Total anticipated reimbursement of nonpower allocations	5,183
Power costs payable by power revenues	2,253
Total reimbursable	7,436

[1] Part of this, under earlier contracts, may not include interest.
[2] Includes costs not allocated, $128 million, $25 million flood control allocation of Hoover Dam, reimbursable investigations costs, and costs of international commitments.
[3] Adjustments pending may reduce this amount by $7 million.
[4] Includes $18 million in funded charges not included in total cost figures used.
[5] Believed to be overstated by the $25 million referred to in footnotes (2) and (4).
[6] Includes $128 million of costs not allocated, some of which may ultimately be declared nonreimbursable; $25 million referred to in footnote (4); and other amounts, repayment of which is not accounted for by Bureau of Reclamation, but which probably will be repaid.

NOTE.—Totals may not add because of rounding.

Other projects on which power must pay substantial amounts allocated to irrigation are Columbia Basin, $474 million; Colorado River storage project and participating projects, $231 million; Central Valley project, $105 million; and Colorado-Big Thompson project, $71 million.

Of the $4,798 million allocated to irrigation, about 28 percent can be seen to come from irrigation water users repayments, 65 percent from power revenues, and the balance from contributions and other sources of repayment, including conservancy districts and future extensions of irrigation water service contracts.

COSTS AND REPAYMENTS TO DATE

Through June 30, 1957, the actual construction costs of reclamation projects were recorded at $2,962,170,706. On the same date, actual repayments of $355,514,171 had been credited, about 12 percent of the actual costs. Of this, $129,985,508 was in matured repayment contracts, $189,134,119 in power revenues, and $36,394,544 from other sources. Of the matured repayment contracts, payments had been met on all but a very small fraction of 1 percent. However, because of various factors, generally relating to deficiencies in repayment ability or project designs, the Congress through June 30, 1957, had been required to authorize nonreimbursable allocations of $71,068,691 of irrigation costs which probably could never have been repaid.

While no project, as defined for the purposes of the statistical summary, has returned its reimbursable construction costs in their entirety, a number of major divisions and features of projects have been fully repaid. These include:

Salt River project, Arizona	$10,450,000 reimbursable cost of original project works.
Yuma project, Arizona	$1,608,640 total cost of Laguna Dam. $978,459 reimbursable cost of distribution system, reservation division.
Boise project, Idaho	$450,660 cost of distribution system, New York irrigation district.
Minidoka project, Idaho	$1,366,871 total cost of Jackson Lake Reservoir. $2,850,000 original cost of gravity division. $3,056,119 Sunnyside pumping division distribution system.
Carlsbad project, New Mexico	$1,141,760 reimbursable cost of original project.
Yakima project, Washington:	
Sunnyside division	$2,270,050 cost of original works.
Tieton division	$3,449,114 cost of original works.

Also, there have been a number of repayment contracts with individuals and irrigation districts and companies which have been paid out in full.

VI. Cooperation and Coordination With Local, State, and Other Federal Agencies

The very nature of the Federal reclamation program has required from the outset a high degree of cooperation and coordination with local and State agencies. Cooperation and coordination with other Federal agencies has come later, along with the increase in magnitude and complexity of the Federal reclamation program and other Federal programs.

LOCAL AGENCIES

Cooperation with local agencies such as irrigation districts, water users' associations, municipalities, etc., in the preauthorization planning stages of reclamation projects is essential, because it is with these agencies, which must contract for return of reimbursable costs, that the consummation and ultimate financial success of the program rests. Once a project is authorized, an even closer relationship with the local agencies must be developed before construction can proceed, as Bureau

of Reclamation policy requires that a repayment contract be entered into prior to the initiation of construction on major project features. This has not always been practicable, for example, where a single large feature serves a number of potential users, but past experience has shown that the Bureau's negotiating position is greatly weakened when construction of any feature is initiated without a signed repayment contract.

Once construction is completed to the point where water is available for delivery, close cooperation with the water users' organizations is necessary to insure an efficient transition from construction to operating status, looking forward to the time when, on all except the large multiple-purpose projects, operation and maintenance of the works can be turned over to the local district.

Through June 30, 1957, the Bureau had succeeded in turning over 119 projects or divisions of projects to local water users' organizations for operation and maintenance. At that time, the Bureau still operated 56 projects or divisions, most of which included either major storage works or facilities still under construction. The Bureau's policies call for turning over all irrigation distribution systems for local operation and maintenance as soon as agreement can be reached with the local water users' organizations. However, even where projects and facilities are operated by the Bureau after completion, operation and maintenance costs are paid by the local organizations in advance.

Recent legislation requiring the formulation of conservancy districts to share the repayment burden on reclamation projects introduces new local agencies with which the Bureau of Reclamation will be required to work in close cooperation during all phases of the reclamation program.

STATE AGENCIES

A close degree of coordination and cooperation with the States, particularly the State engineers' offices, which handle water rights, is necessitated by the provisions of section 8 of the Reclamation Act of 1902, which requires the Secretary of the Interior to proceed in conformity with State laws relating to the control, appropriation, use, or distribution of water used in irrigation. Under the water laws of most States, the Bureau of Reclamation is required to file application for water rights with the State engineer even prior to project authorization, keep him advised of progress toward construction, and make necessary arrangements to perfect the water rights upon completion of the project. In carrying out these requirements, the Bureau of Reclamation has, over the years, built up and maintained very good relationships with the State engineers. Because of the good relationships already achieved and the demonstrated ability of the Bureau of Reclamation to work with the State engineers on matters involving water rights, the Bureau has not become embroiled in recent controversies over the relationship of Federal programs to State water laws.

As Federal programs became more complex and grew in magnitude, the Congress, in the Flood Control Act of 1944, formally enunciated the policy of recognizing the interests and rights of the States in water resources developments within their borders, and enacted legislative provisions which require that the States be given information developed and an opportunity to consult with regard to investigations

of the Corps of Engineers and the Department of the Interior on plans and proposals for water resources developments. The views and recommendations of the States with regard to such developments were required to be transmitted to the Congress along with the agencies' reports on the proposed project. These provisions, which have been included in all subsequent rivers and harbors and flood control omnibus legislation, resulted in still further strengthening of cooperative working relationships with the States. It is not meant to imply that there have not been disagreements. From time to time, some of the States, most often California and Texas, have submitted views taking exception to various aspects of reports on projects proposed by the Bureau of Reclamation. It has generally been possible to reconcile the conflicting views, and the net result is that the projects, when authorized, are even better coordinated with the plans of State agencies than otherwise might have been the case.

A further requirement for coordination with State agencies is set up by the Fish and Wildlife Coordination Act of 1946, which calls for consultation with the head of the State agency exercising administration over the wildlife resources of the State in connection with any impoundment, diversion, or other water control works proposed. This act was reenacted and strengthened in 1958.[82] In carrying out its responsibilities in this field, the Bureau of Reclamation has frequently contracted with the State fish and game agencies to accomplish the necessary work in both planning and construction of facilities to be provided, and, most frequently, for administration of wildlife resources and facilities.

Because of the road relocations involved, reclamation projects must generally be closely coordinated with the State highway departments during both planning and construction stages. Frequently, the State highway departments handle all phases of the road relocations for the Bureau of Reclamation on a reimbursable basis.

Another phase of the Bureau of Reclamation's work where close cooperative relationships with State agencies have been worked out is in the administration of public recreation facilities at reservoirs. In some cases, State parks have been established to develop and utilize the recreational opportunities made available by reservoir construction.

Lastly, but probably one of the oldest areas of cooperation between reclamation and State agencies, is the field of research in engineering, agricultural, and settlement phases of project development, which is handled for the Bureau of Reclamation under cooperative agreements at most of the State colleges and universities in the 17 Western States.

OTHER FEDERAL AGENCIES

Cooperation and coordination with other Federal agencies has evolved much later in time. In the early development of the reclamation program, little attention needed to be given such matters as coordination with other Federal agencies and programs. To be sure, certain coordination with the General Land Office was essential from the very beginning, in the withdrawal of public lands from entry. And cooperation with the Department of Justice in the handling of land condemnation was written into the 1902 Reclamation Act. But by and large, neither the reclamation program nor

[82] Public Law 85-624, Aug 12, 1958, 72 Stat. 563.

the program of other Federal agencies reached the stage where coordination became a continuing problem of major importance until the great expansion of the reclamation program, along with all other Federal programs, in the depression years of the thirties. At that time, the need for coordination made itself felt in several ways.

First, the construction of the large multiple-purpose dams such as Shasta and Grand Coulee made it necessary that the Bureau work in close cooperation with the Bureau of Fisheries (as well as State agencies) in saving the fish runs. Systems of fish traps and hatcheries were worked out, and the results, thanks to the excellent spirit of cooperation which prevailed, were eminently successful.

In the same vein, the unparalleled recreational resources at Lake Mead, behind Hoover Dam, and Millerton and Shasta Lakes, on the Central Valley project, led to cooperative agreements between the Bureau of Reclamation and the National Park Service for the development of national recreational areas at those reservoirs.

A second broad area of cooperative effort was established by the Wheeler-Case Act, as amended, which provided for cooperative agreements between the Secretary of the Interior and the Secretary of Agriculture whereby the latter could handle such matters as project settlement, agricultural development, and repayment.

In similar fashion, because of the sheer magnitude of the projects, the Bureau of Reclamation found it necessary to enlist the aid of many other Federal agencies, and State, local, and private interests in analyzing the effects of and planning for the Columbia Basin and Central Valley projects. The results of these cooperative studies were published [83] by the Bureau of Reclamation, and document two of the major examples of interagency cooperation in planning.

A third way in which the need for coordination made itself felt came as an outgrowth of the enactment of the 1936 Flood Control Act, setting up a national flood control program under the aegis of the Corps of Engineers. As investigations of flood control projects in the West progressed, it soon became evident that there was a great potential area of conflict between the reclamation and flood control programs in the multiple-purpose reservoirs common to both programs in the West.

The 1939 Reclamation Project Act authorized the Secretary of the Interior to make allocations to flood control and navigation after consultation with the Chief of Engineers and the Secretary of the Army, and earlier, the Corps of Engineers had been authorized to include investigations of irrigation potential in its so-called 308 reports. A more basic cause of conflict was both departments sometimes having authorization to investigate projects on the same rivers. In an attempt to resolve potential conflicts before they had gone too far, the Commissioner of Reclamation, the Chief of Engineers, and the Land Use Coordinator of the Department of Agriculture reached agreement in 1939 on a procedure for exchanging information with regard to investigations of proposed projects.

A further agreement, expanded to include the Chairman of the Federal Power Commission, was entered into on December 2, 1943. The four agencies established the Federal Inter-Agency River Basin

[83] "Columbia Basin Joint Investigations," U.S. Department of the Interior, Bureau of Reclamation, 22 volumes, 1941–46, and "Central Valley Project Studies," U.S. Department of the Interior, Bureau of Reclamation, 7 volumes, 1947–49.

Committee for the purpose of coordinating agency programs, and monthly meetings were held to consider matters in connection with the coordination of the programs of the several agencies. The present coordinating committee, the Inter-Agency Committee on Water Resources, was organized at the direction of the President in 1954, and carries on the functions previously handled by FIARBC.

The requirement for coordination of the reclamation program with that of the Corps of Engineers was made a statutory requirement in the previously mentioned 1944 Flood Control Act. Later, the Federal Inter-Agency River Basin Committee was expanded to include the Departments of Commerce, Health, Education, and Welfare, and Labor, and further arrangements governing the review of project reports were agreed to. The Bureau of Reclamation, in adhering to all of the agreements covering coordination and review of reports, is required to make its reports available for official review by 20 to 50 or more Federal and State agencies prior to submission to the Congress.

In more recent years, cooperative work with the Department of Agriculture in the development of irrigation projects has continued, growing in some cases out of the review of project reports under interagency agreements, and in others by direction of the President. Some of the projects on which detailed reports have been prepared by the Department of Agriculture are the Weber Basin project in Utah and some of the participating projects of the Colorado River storage project. Close coordination of the work of the staffs of the two agencies in the field has undoubtedly been helpful in improving the development of projects; however, conflicts have developed on economic matters, particularly with respect to repayment.

While conflicts have not always been fully resolved before transmittal of reports to the Congress, at least they appear to have been fully documented so as to form a background for congressional action.

INTERSTATE COMPACTS

The reclamation program has also been closely geared to the activities of the States in allocating scarce waters of interstate streams between the States by interstate compact. The Bureau of Reclamation has participated in the negotiation of most of the interstate compacts in the West by furnishing staff assistance and information to the negotiators. The close cooperative associations thus formed have continued in the administration of the compact provisions.

VII. Comparison With Other Federal Public Works Programs

In comparing the reclamation program with other Federal public works programs, it must be recognized at the outset that all such programs are based on legislative authorizations emanating at different times under a variety of circumstances from a number of different congressional committees, and that the policies thus established by legislation frequently have required different agencies to take an entirely different approach to many of the problems that are common to the several programs. For example, the Congress has not required interest on the investment to be included as a cost of Federal irrigation. Thus, it appears inappropriate to make comparative economic analyses of the several programs in which interest on deferred repayments

would loom as a major cost. Likewise, costs to local interests of related works, such as land leveling and other settlement costs on reclamation projects, drainage where required on agricultural flood control projects, and agricultural conservation practices in connection with watershed programs, are not always on a comparable basis, nor are estimates of these costs even available on large parts of the program. Some discussion of pertinent policies is included here for a better understanding of the statistics on the programs which follow.

GENERAL POLICIES

Reclamation

From our review of the legislative history of the original Reclamation Act, it appears that the reclamation program was conceived as being somewhat of a cross between the public land disposal programs and the programs for internal improvements of waterways. Various methods had been employed to encourage the farmer to settle on the western lands, including the disposal of public lands (1) to discharged soldiers, as a bonus, (2) to settlers, at a nominal price, (3) to promoters and builders of roads and railways, as an incentive, hoping that they would encourage settlement to build up the transportation business, and, (4) to homesteaders. The homestead policies of the Federal Government were in effect in the decades just preceding the passage of the Reclamation Act, so it was natural that they should have had a major part in the attitudes leading to the Federal reclamation program. In retrospect, it appears that the results of the Reclamation Act policies for disposal of public lands in terms of national growth and opportunities for individuals compare quite favorably with the results of other land disposal policies followed from time to time. However, it would be extremely difficult, if not impossible, to make a qualitative comparison of the contribution to the growth of the Nation's economy made by the reclamation method of public land disposal with the other methods. All methods have yielded sufficiently good results that it is safe to say in retrospect that each was the right thing to do in its time.

The construction of works to irrigate lands already in private ownership came later, and these expenditures likewise had a stimulating effect on the growth of the Nation's economy. In this respect, the reclamation expenditures are more like the expenditures on other Federal internal improvement programs.

Flood control

At the time the reclamation program was initiated, the Federal programs for internal improvements of waterways had been under way for over three-quarters of a century under the Corps of Engineers, and had primarily been oriented to improvement of navigation. However, the legislation setting up the first engineer commission to report on the alluvial basin of the Mississippi River had been charged with reporting on "* * * the best system for the permanent reclamation and redemption of said alluvial basin from inundation * * *" [84] and the plans which were later undertaken by the Mississippi River Commission were intended, among other purposes, to "* * * prevent destructive floods * * *." [85] Legislative provisions of the rivers and harbors appropriations acts until 1890, however,

[84] Act of June 22, 1874, 18 Stat. 199.
[85] Act of June 28, 1879, 21 Stat. 37.

prevented levee construction for the purpose of reclaiming lands or preventing injury to lands or private property by overflows unless such levees were required for navigation. These provisions were dropped in the 1890 Rivers and Harbors Act, but until the First World War the bulk of the flood control works on the Mississippi River had been financed locally, with the Federal levee activity confined primarily to repair and reconstruction of levees damaged or threatened by floods. Federal flood control activity on the Mississippi River was greatly expanded in the Flood Control Act of March 1, 1917,[86] at the same time that a plan for flood control on the Sacramento River in California was adopted. The 1917 act included provisions for local sharing in the cost of the works which were almost the same in degree of magnitude as the interest-free repayment provisions of the reclamation laws. On the Mississippi, local interests to be protected by authorized levee construction or repair were required to put up not less than one-third of the construction cost of levees. On the Sacramento, the State was required to furnish half of the total cost of the flood control projects. In addition, on both projects, lands, easements and rights-of-way were to be provided free of cost to the United States, and levees and other flood control works were required to be maintained by local interests upon completion. Total costs to local interests of these early flood control programs thus would substantially exceed the one-third or one-half of the first cost they were required to put up.

Navigation

On some of the early day navigation improvements of a developmental nature, local interests were also required to contribute substantially toward project costs. For example, the completion of the Houston ship channel authorized by the Rivers and Harbors Act of June 25, 1910,[87] was subject to a contribution of one-half the cost by the Harris County Navigation District. Likewise, on some of the earlier improvements of the Portland, Oreg., Harbor for navigation, local interests were required to make a cash contribution or accomplish a part of the dredging at their expense. The criteria for requiring local contributions appeared to revolve around whether substantial amounts of new commerce were to be generated by the improvement.

So while the repayment idea incorporated in the Reclamation Act seems to be unique among the early programs, there are instances among the other Federal improvement programs of a half century ago where local interests had to contribute toward the costs as a condition of Federal adoption of a project. However, by the early thirties, the navigation program appears to have been put on an entirely Federal basis, with local cost sharing required only on projects which primarily benefited a single user, and, in recent years, on recreational boat harbors. In both the latter cases, a 50 percent local contribution has been required.

Gradual liberalization of policies

Action by the Congress after the great 1927 flood on the Mississippi River led to liberalization of local cost sharing on the flood control program. In authorizing what is essentially the present plan

[86] 39 Stat. 948.
[87] 36 Stat. 630.

for flood control in the alluvial valley of the Mississippi in 1928,[88] no local contribution was required, largely on the grounds that over the years local interests had spent a great deal of their own money on privately constructed flood control works, but the transcendant national interest involved was also mentioned as a reason for not requiring a local contribution. The 1936 Flood Control Act established the national flood control policy, including the policy that local interests should share in the costs of projects to the extent of (*a*) providing lands, easements, and rights-of-way (with a cost limit of one-half the total cost of the project), (*b*) holding and saving the United States free of damages due to the construction works, and (*c*) maintaining and operating all the works after completion. This cost-sharing requirement for dams, reservoirs, and channel improvement projects was abolished in 1938. The cost-sharing requirements remained in effect for levee projects outside of the Mississippi River and tributaries project, however, and subsequently, in 1941, the (*a*), (*b*) and (*c*) requirements for local cost sharing on channel improvement and rectification projects were reinstated.

Thus, it appears that there has been a gradual liberalization of cost-sharing policies on the Federal navigation and flood control programs, paralleling in time the gradual liberalization of the reclamation repayment policies.

Watershed programs

Along with the flood control program of the Corps of Engineers, a program of runoff and waterflow retardation and soil erosion prevention was authorized for accomplishment by the Department of Agriculture. Funds were authorized for investigations in the 1936 flood controls act, and in the 1938 act for prosecution of works of improvement on watersheds in which corps flood control projects had been adopted. However, no work on these was undertaken until the 1944 Flood Control Act authorized comprehensive programs for 11 watersheds that had been reported on by the Secretary of Agriculture. Work on these is now underway, but the policies established in the 1936 and succeeding flood control acts did not prove to be too well adapted to the watershed programs. In order to bring the program closer to the needs, a different approach to watershed improvements has been authorized; first, a pilot watershed program by the Agricultural Appropriation Act of 1953, followed by the Hope-Aiken program in the Watershed Protection and Flood Prevention Act of 1954.[89]

Any comparison of cost-sharing policies of these programs with the other Federal programs is difficult for several reasons. Among these are (1) the close relationship of the watershed program with the agricultural conservation program, (2) the fact that the Hope-Aiken program is carried out by local interests on non-Federal lands, with Federal contribution of certain of the costs, and (3) the authority of the Secretary of Agriculture to work out cost-sharing on an individual watershed basis taking special circumstances into consideration. However, the trend toward liberalization of cost-sharing that has been evidenced in the other programs is present in this one also, as evidenced by the principal amendment to the Hope-Aiken Act which, in the closing days of the 84th Congress, provided among other things for the

[88] Act of May 15, 1928, 45 Stat. 534.
[89] Public Law 566, 83d Cong., 68 Stat. 666.

Federal Government to pay all of the construction costs for flood control.[90]

CORPS OF ENGINEERS' PROGRAMS

The authorized civil works program of the Corps of Engineers is roughly double the Bureau of Reclamation's program in dollar magnitude, but contains a great many more projects most of which are much smaller, and it is not quite as far along toward completion as is the Bureau's authorized program.

The corps, active, authorized program as of June 30, 1957, is summarized in the following table:

Status of Corps of Engineers programs

Status, June 30, 1957	Number of projects or project authorizations	Total estimated cost	Appropriations through fiscal year 1957	Required to complete
		Millions	*Millions*	*Millions*
Completed, or substantially so	2,322	$3,441	$3,412	$29
Under construction	403	7,866	3,875	3,991
Authorized, but not started	470	5,300	24	5,276
Total	3,195	16,607	7,311	9,296

This is an understatement of the current program, since in the second session of the 85th Congress, omnibus authorization legislation was enacted which added 139 projects costing almost $1 billion to the Corps' program. Also, the Congress provided funds for starting 111 new projects in the 1958 and 1959 appropriations, having total costs of over $1,438 million.

FLOOD CONTROL RELATED PROGRAM

The flood control program of the Corps of Engineers is most nearly like the reclamation program. Even so, because the annual appropriations for construction of multiple purpose projects as well as for operation and maintenance and for surveys are made in a lump sum, it is not always possible to compile statistics on the flood control program separately from those on the navigation program. However, a rather detailed analysis of the program made by the Corps of Engineers in 1951 and broken down between flood control and navigation is presented in the Annual Report of the Chief of Engineers for 1951. At that time, the total amount appropriated on the flood control program ($3,733,100,000 through fiscal year 1952) was very closely equivalent to the amount appropriated for the Federal reclamation program ($3,658 million through fiscal year 1957), so that, if we overlook the changing value of the dollar, and the acceleration of the rate of appropriations for the flood control program in recent years, a good basis for a rough comparison with the reclamation program is afforded.

Of the $3,733,100,000 appropriated for flood control activities, which is about 47 percent of all funds appropriated for the corps civil works program through 1952, some $174 million was for work on the Mississippi River, which has been superseded by the existing project for

[90] Public Law 1018, 84th Cong., 70 Stat. 1088.

the alluvial valley of the Mississippi. The balance, $3,559,100,000, was used as follows:

	Amount	Percent
New work, construction of projects	$3,156,900,000	88.9
Maintenance and operation	212,500,000	5.9
Emergency flood fighting, repair of damaged local works, surveys, and contingencies	189,700,000	5.2
Total	3,559,100,000	100.0

The status of the construction program at that time is given on table XVI, which also gives the status of local cost sharing. Direct comparison with the reclamation cost sharing becomes difficult, when expressed in terms of first costs, because in the flood control program the local share is put up during or in advance of construction, whereas the reclamation cost sharing is a reimbursement of Federal funds expended, but without interest. The percentages of local contribution shown are understated because allocations of portions of the costs of flood control projects to purposes other than flood control are ignored, as are the rather substantial revenues to be received from the sale of electric power. In addition to the local contributions shown, local interests through 1950 had spent $123,200,000 for new work, and $27,600,000 for operation and maintenance of flood control works which have been incorporated into Federal flood control projects or serve as an essential adjunct to Federal projects.

TABLE XVI.—*Corps of Engineers flood control program, 1951*

[Construction costs of program in millions of dollars]

Status	Number of projects	Total costs			Local costs expressed as percent of total	Cost to date of analysis		Required to complete	
		Federal	Local	Total		Federal appropriations through 1952	Local expenditures through 1950	Federal	Local
Completed or in operation	330	3,057.0	176.4	3,233.4	5.5	2,067.1	146.9	989.9	29.5
Under construction, not in operation	86	2,161.6	97.3	2,258.9	4.3	1,063.1	33.8	1,098.5	63.5
Authorized, not started	580	4,817.3	206.0	5,023.3	4.1	26.7	1.6	4,790.6	204.4
Total	996	10,035.9	479.7	10,515.6	4.55	3,156.9	182.3	6,879.0	297.4

In addition to the contribution toward first costs, local interests are required to operate and maintain most of the local protection projects. Non-Federal expenditures for this purpose totaled $52,063,000 through fiscal year 1950. For the entire authorized program it was estimated in 1951 that the costs to local interests for operation and maintenance would be $14,027,000 annually. Costs to the Federal Government for operation and maintenance of all projects required to be operated and maintained by the Federal Government after completion were estimated at $46,853,000 annually, thus it appears that about 23 percent of annual operation and maintenance costs of the total program will be borne by non-Federal interests.

A rough approximation of the geographic distribution of the costs and average annual benefits of the Federal flood control program is given on table XVII. When the benefits are compared with the estimate of gross average annual flood damages that would be experienced without any flood control projects, it can be seen that the flood control job was about three-eighths completed in 1950, and probably is about half completed now if consideration is given to the large volume of work accomplished since that time. It should be made clear at this point that the authorized program will not prevent all flood losses, nor will it ever be possible to do so. Also, that the potential damages prevented tend to increase with development of the flood plain. The success of the flood control program is quite dramatically shown by the fact that the cumulative total of flood damages prevented is several times the total investment in flood control facilities, without any credit being taken for the other important benefits of the flood control program. The great bulk of the damages were prevented by the project for the protection of the alluvial valley of the Mississippi River, and the corps estimated on the basis of average annual costs and benefits in 1950 that the benefit-cost ratio for that project was 3.8. At the same time, the ratio of benefits to costs for all other completed projects was 1.35 and of the projects under construction at that time, 1.64. For the authorized projects not started, the corps estimated the benefit-cost ratio at 1.04, showing that, as in the case of the Federal reclamation program, the projects having the best justification generally are being built first.

TABLE XVII.—*Distribution of gross potential flood damages and cost of authorized Federal flood control program*

[In millions of dollars]

Geographic area	Total Federal cost of authorized program, 1951	Corps of Engineers [1] estimate of total average annual flood damages	Average annual flood damages prevented by projects completed as of June 30, 1950	Actual damages prevented fiscal year 1957 estimated by Corps of Engineers	Cumulative total of flood damage prevented by corps project through June 30, 1957
New England	251.2	53.0	12.1	1.4	98.5
North Atlantic	581.1				127.6
South Atlantic	422.3	32.0	8.4	9.5	34.7
Lower Mississippi Valley	1,426.8	247.8	226.1	200.3	5,985.6
Upper Mississippi Valley	366.1	65.3	4.6	.4	107.2
Ohio River Basin	1,776.3	97.3	23.7	30.0	493.9
Great Lakes Basin	105.2	6.4	.6	1.6	9.0
Missouri River Basin [2]	1,621.4	54.6	2.9	14.4	764.4
Gulf Southwest	1,386.5	119.7	8.2	145.3	264.9
Pacific Southwest	919.5	103.8	12.7	10.1	571.1
Pacific Northwest	1,176.7	31.5	9.4	12.5	208.5
Territories	2.8	[3]	[3]	.1	1.6
Total	10,035.9	809.4	308.7	425.6	8,667.0

[1] Estimate as of 1950, assuming degree of river valley development in areas subject to flooding as of 1948, and without any flood control works.
[2] Includes Red River of the North drainage basin.
[3] Not available.

An important consideration not reflected in the tabulation of damages prevented is the matter of loss of life caused by floods. The Weather Bureau compiles statistics on this loss, and also on the actual property losses from flood damages. Weather Bureau figures for these losses from 1925 through 1957 are shown on table XVIII. The

average flood damages recorded by the Weather Bureau include only actual property damages suffered, and thus are less than the Corps of Engineers' estimates.

TABLE XVIII.—*Loss of life and property damage from floods, 1925–57*

Year	Lives lost from floods	Property damage from floods	Year	Lives lost from floods	Property damage from floods
1925	42	$9,922,000	1943	123	$216,498,000
1926	285	129,970,000	1944	97	266,089,000
1927	423	347,658,000	1945	98	245,930,000
1928	1,851	69,614,000	1946	28	76,014,000
1929	92	68,752,000	1947	108	408,086,000
1930	14	15,850,000	1948	85	248,360,000
1931	0	2,810,000	1949	52	152,682,000
1932	11	10,295,000	1950	112	211,899,000
1933	96	82,329,000	1951	51	1,030,742,000
1934	105	15,121,000	1952	57	256,814,000
1935	650	138,630,000	1953	42	128,366,000
1936	151	284,849,000	1954	237	854,622,000
1937	142	440,782,000	1955	449	1,165,000,000
1938	780	401,345,000	1956	42	64,688,000
1939	86	13,836,000	1957	[1] 110	[1] 300,000,000
1940	111	45,210,000			
1941	57	47,200,000	Average	203	238,651,000
1942	76	125,607,000			

[1] Preliminary estimate.

Source: U.S. Weather Bureau.

Agricultural effect of flood control program

The agricultural effect of the Federal flood control program is probably greater than that of the Federal reclamation program. Of some $5 billion in flood damages prevented by the lower Mississippi Valley project through 1951, about 73 percent were rural and agricultural, and 27 percent urban and industrial.

Altogether, the complete authorized flood control program as of June 30, 1950, was estimated to provide partial to full protection against flood damage for 43,555,000 acres of land, geographically distributed as follows:

TABLE XIX.—*Agricultural lands protected by Federal flood control program* [1]

[In thousands of acres]

Region	Completed or in operation	Under construction	Not yet under construction
New England	64	1	37
North Atlantic	12	127	32
South Atlantic	188	725	727
Lower Mississippi Valley	[2] 21,417	1,380	6
Upper Mississippi Valley	528	507	634
Ohio River Basin	328	464	2,721
Great Lakes Basin	72	68	51
Missouri River Basin	495	1,171	1,523
Gulf Southwest	1,824	1,765	2,045
Pacific Southwest	860	685	1,917
Pacific Northwest	262	262	857
Total	26,040	7,165	10,350

[1] Annual report of the Chief of Engineers, U.S. Army, 1951, pt. 1, vol. 3, p. 364.
[2] Includes effect of alluvial valley and general flood control projects in the lower Mississippi Valley.

About 55 percent of these lands require related drainage improvements by local interests to make the lands suitable for agricultural use.

The Corps of Engineers estimates that the improvement in agricultural production made possible or to be made possible by its authorized program as of June 30, 1950, was the equivalent of the reclamation of 8 million acres of new land.

NAVIGATION RELATED PROGRAM

As pointed out earlier, the corps' river and harbor program of improvements for navigation was a forerunner of the Federal reclamation program, and it has some of the developmental aspects of the reclamation program.

The navigation program reported on in the Annual Report of the Chief of Engineers, 1951, encompasses some 28,600 miles of federally improved inland waterways, including 312 locks and 219 navigation dams; improvements to 417 commercial harbors, including 131 in the Great Lakes; and improvement of a vast number of small recreational and fishing boat harbors and channels.

Through fiscal year 1952, $4,144,000,000 had been appropriated for the program, distributed as follows:

Appropriations for navigation related program, through fiscal year 1952

	New work (construction)	Maintenance and operation	Total
Seacoast harbors	$807.9	$547.7	$1,353.6
Great Lakes harbors and channels	228.3	159.8	388.1
Inland and intracoastal waterways	1,159.2	564.5	1,723.7
Total	2,195.4	1,272.0	3,467.4
Old work superseded and prior to current program			410.0
Miscellaneous—salaries, expenses, examinations, surveys, transfers to other agencies, etc.			266.6
Total			4,144.0

The program current at the time the 1951 report was prepared was broken down as follows:

Status of navigation program, 1952

Status	Number of authorizations	New work in millions of dollars (rounded)		
		Estimated Federal cost	Funds appropriated through fiscal year 1952	Funds required to complete
Completed	1,721	914.7	859.2	55.5
Under construction:				
In operation	155	1,367.8	1,052.9	314.9
Not yet in operation	34	1,171.4	271.1	900.3
Authorized, not started	369	3,174.1	12.2	3,161.9
Total	2,279	6,628.0	2,195.4	4,432.6

Local cooperation on the navigation program generally consists of the provision of lands, easements, and rights-of-way for construction and maintenance of the works (generally limited to the provision of spoil areas, since the works are usually in publicly owned navigable waters); holding and saving the United States free from damages due to the construction works; providing and maintaining adequate public terminal and transfer facilities open to all on equal terms; and in some cases, accomplishment of certain utility and highway alterations. In addition, from time to time, cash contributions by local interests are required when deemed warranted and appropriate. These are usually for benefits defined as "special local benefits" e.g. when the project is primarily for a single user, or is primarily to benefit recreational boating, and, in some cases, where a new facility is to be built for developmental purposes. The Chief of Engineers estimated that such contributions would probably exceed $100 million through 1951, which would have been about 4½ percent of the cost of new work. While this compares favorably with local cost-sharing on the first cost of flood control projects, the total local share of the cost is considerably less, because maintenance of almost all navigation projects is entirely at Federal expense. In recent years, the cost of operation and maintenance has averaged about $75 million annually. Figures are not available on local amounts expended for public terminal and transfer facilities, but these can usually be provided on a self-liquidating basis.

Accomplishments and benefits of the navigation program

Economically developed navigable waterways, accompanied by efficient shore handling facilities, frequently furnish the cheapest mode of transportation of bulk raw materials and heavy commodities basic to much of our industrial production. These are some of the main reasons why most of the large cities and industrial centers, in the United States and all over the world, are on navigable waters. The 1950 census shows that 30 of the 36 cities of the Nation having a population of 300,000 or more are on navigable waters, and that 73 of the 106 cities of more than 100,000 are on navigable channels improved entirely or in part by the Federal Government.

The continuing increase in shipping in United States ports and waterways amply demonstrates the vital importance of the Federal navigation program. After eliminating all known duplications, the net total waterborne commerce in the United States in 1929 was 583.8 million tons. This increased to 820.6 million tons in 1950 and to 1,131.4 million tons in 1957. Approximately half of the total traffic is in coastal harbors and channels. Through fiscal year 1952, the improvement and maintenance of the 286 commercial harbors on the coasts of the United States and its possessions had required appropriations of $1,355,600,000, about one-third of the total appropriations for the navigation program. It is neither practicable nor necessary to place a monetary evaluation on the contribution of these harbors to the welfare of the Nation, as they are essential facilities both for maintenance of our maritime commerce in peace and for use in time of war for operations essential to our national security.

The 131 Great Lakes harbors and their connecting channels likewise have a value that is hard to measure in dollars but which is essential to much of the heavy industry of the Middle West. And with the

completion of the St. Lawrence seaway, these ports will become an extension of our coastal facilities, available to the commerce of the world. Traffic on the Great Lakes has fluctuated from a low of 25 billion ton-miles in the depths of the depression in 1932, to over 125 billion ton-miles in 1953. Since 1940, traffic has averaged about 110 billion ton-miles. The benefits of this traffic to our economy far outweigh the relatively small cost of about $388 million invested in the Great Lakes improvements through 1952. A considerable increase in investment is now underway in Great Lakes-St. Lawrence navigation facilities; however, the St. Lawrence seaway itself, which will provide deep-draft access to the Great Lakes ports from the sea is to be self-sustaining through toll charges to be imposed on shipping. The use of all other navigation facilities provided by the Federal Government has been free.

The third great element of the Federal navigation program is the system of inland and intracoastal waterways. This part of the program has been the subject of as much controversy as the Federal reclamation program, and a detailed discussion of this aspect is beyond the scope of this report.

Traffic on the inland and intracoastal waterways has grown at a tremendous rate. From 8.6 billion ton-miles in 1929, traffic increased to 51.7 billion ton-miles in 1950, and to 114.6 billion ton-miles in 1957. The existence of these waterways has stimulated vast expenditures for privately financed industrial facilities that rely on waterway traffic for movement of their raw materials or finished products. As an example, one may cite the recent substantial aluminum industry that is springing up in the Ohio Valley.

An analysis of the 15 principal inland waterways was made by the Corps of Engineers for the 20-year period 1929–48, and is reported on in volume 3 of the "Annual Report of the Chief of Engineers for 1951." That analysis shows a benefit-cost ratio of 2.5 for the group of waterways as a whole for the 20-year period, even though some of the waterways were not yet complete. With completion of the waterways and growth of traffic, the overall ratio would increase substantially.

Some transportation economists question the validity of the corps' estimates of benefits because they are generally based on savings over alternative transportation rates rather than savings over incremental costs of additional traffic moved over competing transportation mediums, but the overall margin is great enough that there would be a substantial excess of benefits over costs for the overall program in any event. However, some projects would have benefit-cost ratios of less than unity, and it is these marginal projects which cause some of the controversy over the entire program, just as on the reclamation program, it is the few projects which have been failures which become the focus of questions raised concerning the entire program.

OTHER BENEFITS FROM CORPS' PROGRAM

The foregoing discussion of the corps' program has considered the entire program as being broken down between flood control and navigation. Actually, these programs, like the reclamation program, include substantial amounts of hydroelectric power, municipal and industrial water supply, and other benefits.

Hydroelectric power

On June 30, 1957, the Corps of Engineers had 4,824,400 kilowatts of hydroelectric power installed capacity at 29 projects, or some 3.9 percent of the Nation's total installed capacity and 18.3 percent of the hydroelectric power generating capacity. In this respect the corps' power program at the end of the 1957 fiscal year was of roughly the same magnitude as that of the Bureau of Reclamation.

In fiscal year 1958, the corps had under construction 3,882,000 kilowatts of additional generating capacity at 6 operating projects and 14 new projects, for an ultimate installed capacity of 9,552,400 kilowatts. Most of the growth of the corps' program has been in recent years; all but 5 of the projects having begun operation in the 1950's. Other large projects are authorized, and it appears that the corps' power program will eventually be double the authorized reclamation power program.

Generation of energy in the 1957 fiscal year was 22.6 billion kilowatt-hours, slightly less than 4 percent of the Nation's total.

Municipal and industrial water supply

The Corps of Engineers has had authority since 1937 [91] to modify the plans for a reservoir project to provide additional water storage capacity for domestic water supply or other conservation storage on the condition that the cost of the increased storage capacity is contributed by local agencies. Additional authority was given in the Flood Control Act of December 22, 1944, for contracts for disposal of surplus water that may be available at any Corps of Engineers reservoir for domestic and industrial uses. Also, from time to time, special legislation has been enacted to provide for including municipal and industrial water supplies in various corps projects.

To avoid water right problems, most of the municipal and industrial water supplies from corps projects are provided on the basis of storage space in reservoirs, and water rights are handled by local interests. The Corps of Engineers has 1,232,441 acre-feet of municipal water supply storage in operation; another 174,700 acre-feet of storage in completed projects has been authorized by recent legislation, but is not yet in operation; and 800,600 acre-feet of storage space for municipal and industrial water supply purposes is under construction, for a grand total of 2,207,741 acre-feet. Details of this are shown on table XX.

[91] Act of July 19, 1937, 50 Stat. 515, 33 U.S.C. 701h.

TABLE XX.—*Water supply storage, Corps of Engineers reservoirs*

WATER SUPPLY STORAGE IN OPERATION

Reservoir	Local agency	Water supply storage (acre-feet)
San Angelo, Tex.	Upper Colorado River Authority	80,351
Berlin, Ohio	Mahoning Valley Sanitary District	19,400
Mosquito Creek, Ohio	Warren, Ohio	11,000
Burr Oak, Ohio	State of Ohio	9,300
Hords Creek, Tex.	Coleman, Tex.	5,780
Lewisville, Tex.	Dallas, Tex.	415,000
	Denton, Tex.	21,000
Grapevine, Tex.	Dallas, Tex.	85,000
	City of Grapevine, Tex.	1,250
	Park Cities, Tex.	50,000
Lavon, Tex.	North Texas Municipal Water District	100,000
Texarkana, Tex. and Ark.	Cities of Texarkana, Tex. and Ark.	[1] 13,400
Lake Texoma (Denison), Tex. and Okla.	Denison, Tex.	21,300
Belton, Tex.	Brazos River Authority	113,700
	Fort Hood, Tex.	12,000
Canton, Okla.	Oklahoma City, Okla.	90,000
Clark Hill, Ga. and S.C.	McCormick, S.C.	210
Baldhill, N. Dak.	Eastern North Dakota Water Development Association	[1] 69,500
Homme, N. Dak.	Park River and Grafton, N. Dak.	[1] 3,650
Heyburn, Okla.	Kiefer, Okla.	1,000
Hulah, Okla.	Bartlesville, Okla.	15,400
Dam "B", Texas	Lower Neches Valley Authority	[2] 94,200
Total		1,232,441

WATER SUPPLY STORAGE AUTHORIZED BY SPECIFIC ACTS—NOT YET IN OPERATION [3]

Buford, Ga.	Gwinnett County, Ga.	11,200
Benbrook, Tex.	Fort Worth, Tex.	72,500
Lake Texoma (Denison), Tex. and Okla.	Sherman, Tex.	41,000
Whitney, Tex.	Several communities in area	50,000
Total		174,700

UNDER CONSTRUCTION

Ferrells Bridge, Tex.	Northeast Texas Municipal Water District	251,100
Oologah, Okla.	Tulsa, Okla.	38,000
	Collinsville, Okla.	500
	Public Service Co. of Oklahoma	5,000
	Claremore Foundation, Oklahoma City, Okla.	2,500
Waco, Tex.	Brazos River Authority	91,074
	Waco, Tex.	[4] 13,026
Canyon, Tex.	Guadalupe-Blanco River Authority	366,400
McGee Bend, Tex [5]	Lower Neches Valley Authority	(6)
Carlyle, Ill.	State of Illinois	33,000
Total		800,600
Grand total		2,207,741

[1] Storage made available by seasonal operation for flood control and water supply.
[2] Includes water for rice irrigation.
[3] Under consideration.
[4] Exchange storage for existing storage in Lake Waco.
[5] Water supply obtained from power releases.
[6] Involved in litigation.

During fiscal year 1957, 448,000 acre-feet of water for municipal and domestic purposes was furnished from corps reservoirs, about 60 percent of the reclamation project deliveries for such purposes. The corps also reports conservation storage releases of 3,426,000 acre-feet, which improve the quality of water supplies downstream, some of which are used for municipal and industrial water supply purposes.

The corps' program will be greatly expanded under authority contained in the Water Supply Act of 1958.

Irrigation water supply

Just as many Bureau of Reclamation projects provide flood control benefits, a number of Corps of Engineers reservoirs include storage for irrigation water supply purposes. The 1944 Flood Control Act provided that the use of corps projects for irrigation purposes is to be under the provisions of the Federal reclamation laws. At the end of fiscal year 1957, the Corps of Engineers had 813,000 acre-feet of storage space used exclusively for irrigation purposes in 3 reservoirs, and 3,162,000 acre-feet of joint use storage space in 9 reservoirs that that was available for irrigation storage in conjunction with its use for flood control or power generation, a total of 3,975,000 acre-feet.

Public recreation use

The use of Corps of Engineer reservoirs by the public for recreational purposes far exceeds the similar usage on reclamation projects, not only because of the greater number of corps reservoirs, but because the corps has general authority to construct facilities to promote recreational use of its projects. Recreational use is growing rapidly. Public use attendance has grown from 26 million in 1952 to over 70 million in 1956 and an estimated 80 million in 1958. In addition to the large number of new reservoirs placed in operation since 1952, and the increase in public interest in this type of recreational activity, the great increase is probably also a reflection of improved methods of counting attendance.

While the majority of the public-use facilities have been provided by the Corps of Engineers, local interests have shown a considerable interest in developing parks and recreational facilities. The corps reports 96 grants of areas to States, 53 to counties, and 72 to cities for public park and recreational use, and 67 grants of areas to States for fish and wildlife management purposes.

Fish and wildlife

The use of the corps' reservoirs and other project areas for hunting and fishing as on the reclamation projects, has reached vast proportions, but no statistics of such use have been compiled.

WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAMS, DEPARTMENT OF AGRICULTURE

As discussed earlier, these programs are carried out under three basic authorities, the Flood Control Act of 1944, the Agriculture Department Appropriation Act, 1953, and Public Law 566, 83d Congress, as amended.

The 11 watersheds for which runoff and waterflow retardation and soil erosion prevention programs were authorized in accordance with reports by the Secretary of Agriculture, are listed on table XXI, which gives the estimated cost of the program at time of authorization, the latest estimate of cost, amounts obligated through June 30, 1957, balance to complete, and percentage complete at that time. The threefold increase in estimated costs in 10 years, a situation not

unheard of in the other Federal programs, is about half due to increases in price levels and half due to major changes in the scope of the projects, largely the addition of structural measures to the land treatment measures which were the basis of the 1944 work programs.

TABLE XXI.—*Watershed protection and flood control program, Department of Agriculture: Costs and progress through June 30, 1957 (11 authorized watersheds)*

[1954 prices]

Watershed	Original estimated cost to United States (1944)	Present estimated cost to United States	Amount obligated to June 30, 1957	Estimate of remaining cost to United States July 1, 1957	Estimated percent completed June 30, 1957
Buffalo Creek, N.Y.	$739,000	$4,671,594	$2,551,302	$2,120,922	54.6
Colorado (middle), Texas	2,693,000	29,870,697	4,024,700	25,845,997	13.5
Coosa, Ga.	1,233,000	8,147,053	1,980,907	6,166,146	24.3
Little Sioux, Iowa	4,280,000	25,568,552	8,088,644	17,479,908	31.6
Little Tallahatchie, Miss.	4,221,000	14,297,289	4,765,901	9,531,388	33.3
Los Angeles, Calif.	8,380,000	19,350,496	8,273,760	11,076,736	42.7
Potomac, Md., Pa., Va., and W. Va.	859,000	15,510,070	1,637,652	13,872,418	10.5
Santa Ynez, Calif.	434,000	3,791,276	1,786,075	2,005,201	47.1
Trinity, Tex.	32,000,000	80,274,576	14,518,668	65,755,908	18.0
Washita, Okla.	11,243,000	47,642,429	12,917,589	34,724,840	27.1
Yazoo, Miss.	21,700,000	39,339,364	8,189,922	31,149,442	20.8
Subtotal	87,782,000	288,463,396	68,735,120	219,728,276	23.8
Emergencies			1,049,957		
Total	87,782,000	288,465,396	69,785,077	219,728,276	

[1] House Committee on Appropriations. Department of Agriculture appropriations for 1959, pt. 1, p. 387. Table based on 1954 price levels.

The program is only about 25 percent complete on June 30, 1957, and work on only one of the watersheds is half completed. Estimates of the time required for completion of the work range from about 5 years to almost 25 years. Because of the incomplete status of the program, no attempt has been made to evaluate the benefits. However, the following measures had been completed through June 30, 1957.

Floodwater retarding structures	number	455
Stabilization and sediment control structures and silt and debris basins	number	6,750
Outlet construction	miles	11
Grassed waterways	acres	2,032
Channel stabilization and channel improvements	miles	1,111
Diversion construction	do	726
Levees and dikes	do	30
Channels excavated	do	19
Roadside erosion control	do	2,544

The pilot watershed program undertaken under authority of the Department of Agriculture Appropriations Act, 1953, covered 62 watershed projects, with an estimated total Federal cost in 1954 of $28,706,000. Seven of these projects were terminated because of lack of interest and inability of local interests to obtain land, easements, and rights-of-way; and one has been completed. Through fiscal year 1957, $25,200,000 had been appropriated, but in the meanwhile, costs of the remaining 54 watersheds had increased by 22.6

percent to $35,100,000. The following measures had been completed through fiscal year 1957:

Floodwater retarding structures	number	206
Stabilization and sediment control structures and silt and debris basins	number	1,736
Subwatershed waterway improvements	miles	59
Stream channel stabilization and improvements	do	157
Diversion construction	do	12
Roadside erosion control	do	296

The program under the Watershed Protection and Flood Prevention Act of 1954 will be by far the largest of the three programs and will be the means of carrying the runoff and waterflow retardation program forward, since the general authority under the Flood Control Acts of 1936 and 1938 is superseded and will no longer be used after the completion of the 11 watersheds, and since the pilot watershed program is to be completed in fiscal year 1961. The principal difference between the 1954 act programs and the others is that it places the responsibility for construction on the local interests.

It has taken longer than was originally anticipated for the work to get underway, but it appears that it is being stepped up as rapidly as is possible.

By October 30, 1957, the Soil Conservation Service reported the following accomplishments under the program on 36 projects in 18 States:

Number and type of measures	Status	Estimated construction cost
7 floodwater retarding structures	Completed	$176,315
14.6 miles drainage ditches	Completed (final cost)	64,507
Subtotal (6 projects completed)		240,822
30 floodwater retarding structures	Under construction	1,392,150
29.84 miles channel improvements	do	270,660
202 acres critical area stabilization	do	13,724
4 miles roadside erosion control	do	
2.5 miles subwatershed waterways	do	
20 acres seeding	do	
Subtotal (21 projects under construction)		1,676,534
77,707 feet channel improvements	Invitation out for bids	94,260
6 floodwater retarding structures	do	280,328
Subtotal (3 projects invitation out for bids)		374,588
10 floodwater retarding structures project	Agreement signed	565,112
1 floodwater diversion and training dike	do	29,598
11.38 miles channel improvements	do	63,035
Subtotal (6 project agreements signed)		657,745
Total, estimated construction cost		2,949,689
Estimated Federal share		2,763,118

The local share of the construction costs of these 36 projects is about 6.7 percent. Considerable controversy has arisen over the cost sharing on this program, and the Bureau of the Budget is reported to have the matter under study in connection with recommendations expected to be made on uniform cost sharing on all Federal flood control projects, so that it appears inadvisable to draw any conclusions on cost sharing from this first small sample.

The future magnitude of the program is indicated by the Department of Agriculture's latest report, which indicates that through October 1958, 971 applications for assistance in planning watershed programs had been received from groups in all States except Maine and Rhode Island. These watersheds encompass 72,761,000 acres. Authorizations for assistance in planning had been granted on 387 watersheds, aggregating 28,570,000 acres, and authorizations for Federal participation in costs had been granted on 133 watersheds, of 7,398,000 acres. Appropriations for the program have been at the $25 million level for the past 2 years.

The Administrator of the Soil Conservation Service has estimated that there are 8,000 watersheds in the United States and its territories which have some water management problem, of which about 4,000 could be feasible projects under this program, and he expects that the program will require an appropriation level of $80 to $100 million annually in 5 or 6 more years.

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